



MITIGATION PLAN

Final

December 2019

SANDY BRANCH MITIGATION SITE

Chatham County, NC
DEQ Contract No. 7527
DMS ID No. 100060

Cape Fear River Basin
HUC 03030003

USACE Action ID No. SAW-2018-01167
DWR Project No. 2018-0786
RFP #: 16-007331

PREPARED FOR:



NC Department of Environmental Quality Division of Mitigation Services

1652 Mail Service Center
Raleigh, NC 27699-1652

PREPARED BY:



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This mitigation plan has been written in conformance with the requirements of the following:

- Federal rule for compensatory mitigation project Sites as described in the Federal Register Title 33 Navigation and Navigable Waters Volume 3 Chapter 2 Section § 332.8 paragraphs (c)(2) through (c)(14).
- NCDEQ Division of Mitigation Services In-Lieu Fee Instrument signed and dated July 28, 2010.

These documents govern DMS operations and procedures for the delivery of compensatory mitigation.

Contributing Staff:

John Hutton, *Project Manager*

Greg Turner, PE, *Lead Designer*

Carolyn Lanza, *Lead Scientist*

Charlie Neaves, *Wetland Designer*

Angela Allen, PE, *Lead Quality Assurance*



December 12, 2019

Ms. Kim Browning

Department of the Army
Wilmington District, Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403-1343

RE: Sandy Branch Mitigation Site – NCIRT Comments during 30-day Mitigation Plan Review
Sandy Branch Mitigation Site (USACE AID# SAW-2018-01167, NCDMS # 100060)
Cape Fear 03030003, Chatham County, NC

Dear Ms. Browning,

Thank you for compiling and providing comments on the Sandy Branch Mitigation Site final draft Mitigation Plan. We have reviewed the comments dated November 4, 2019 and have revised the Mitigation Plan accordingly. This letter includes a response to each comment; comments have been reprinted with our response in *italics*. The revised Mitigation Plan is being submitted with this letter.

DWR Comments, Erin Davis and Mac Haupt

1. Page 3, Section 3.3 – Why weren't aerials from 2006 to 2018 reviewed? Google Earth aerials from 2008 and 2009 of the Project Location show clearing of both forested buffers of UT2 upstream of the proposed restoration reach. Additional clearing of the Project Location immediately adjacent to the proposed easement is shown on 2017 and 2018 aerials (not shown on plan figure basemaps). Please include a description of recent Project Location land cover changes.

Section 3.3 will be revised to include the following description of land use changes on UT2: "The landowner conducted some tree clearing activities along UT2 upstream of the project in 2007/2008 and again in 2017. The landowner cleared a wooded buffer around the upstream channel in 2007/2008 to create a larger hay field. Figures A and B (See Appendix 2) show this area before and after the clearing. Although the stream and wetland determination for this project did not extend that far upstream, we believe this area would delineate as ephemeral stream channel. Additionally, this portion of the Cape Fear 03 subbasin does not have riparian buffer rules. A comparison of Figures A and B does not indicate that the stream was channelized during the clearing process.

Additional clearing was conducted downstream of the area described above in 2017. A review of historic aerials showed this area was a farm pond in 1993 (See Figure C, Appendix 2). By 2007 the dam had been breached but the immediate riparian corridor was maintained as cattle pasture without any apparent channel dredging (See Figure D, Appendix 2). The available aerials between 1993 and 2007 are not clear enough to pinpoint the date of dam removal more precisely. The immediate riparian corridor was maintained as cattle pasture up to the point of clearing activities in 2017, so it appears very few, if any, trees were removed within 30 feet of the stream channel.



Finally, the landowner improved a farm road in conjunction with the 2017 clearing along UT2. It is clear in the 2007 aerial (See Figure D, Appendix2) that the landowner maintained this farm road below canopy cover as with the current roads in the woods between the project area and the farmhouse. Overall, it is Wildlands' opinion that no rules were violated in the 2007/2008 clearing, the 2017 clearing, or the concurrent farm road improvement."

2. Page 8, Section 3.6 – Please note the NC SAM results in the existing conditions discussion.
The NC SAM results are noted in the existing conditions discussions and listed in Table 7.
3. Page 11, Section 5.3 –
 - a. The proposed easement break appears like it would lead to clearing of the forested area west of the easement for access and still require livestock to cross UT1 just upstream of the easement boundary to arrive at the east pasture. Was an easement break considered where the proposed easement narrows along Reach 2 (area cleared in 2017-2018) and there appears to be an existing stream crossing location?
There is an existing path through the forested area directly to the west of the proposed easement break. The path is under tree cover and cannot be seen from aerial imagery. The path serves an existing stream crossing at the proposed easement break location. Locating an easement break where the proposed easement narrows along Reach 2 would result in significant impacts to trees.
 - b. DWR recommends a 50-ft setback of the proposed easement from the existing road edge to avoid potential future transportation easement encroachment requests.
The easement was designed to align with the edge of right of way and right of way fencing. Leaving a gap would allow cattle access at the upstream end of the project. Additionally, the culvert under Elmer Moore Road was replaced in 2017 so is unlikely to be replaced again in the next 30 years.
4. Page 21, Section 8.6.1 & Design Plans – The text notes that channel plugs will be constructed. Please show proposed plug locations on the plan view sheets and include a typical detail. DWR requests plugs be a minimum of 50 feet wide and include high clay content substrate.
The plugs discussed in this section were proposed only where the abandoned channel features tie to Sandy Branch. We have not typically used details and specifications to describe these plugs to the contractors, rather it has been explained in the field that we want to use high clay content soil and compact the soil by driving over the plug with machinery. This has not been a problem on any past projects.
5. Page 24, Section 9.2 – DWR recommends treating woody invasives annually.
Wildlands approach to invasive species management is to conduct quarterly site visits where sporadic invasives are treated. Any larger populations are dealt with at the appropriate times of year and followed with continued control as needed. The frequency may be annual or more or less often.
6. Page 24, Section 9.4 – As per the 2016 IRT Guidance, the soil temperature needs to be tied to tree bud burst. DWR requests that the tree species to be used to correlate bud burst with soil temperature for growing season start be identified in the MYO report.
The MYO report will identify the tree species that will be used to corroborate the start of the growing season.

7. Figure 9 – There is a narrow linear wetland (approximately 5 feet wide) that is being requested for rehabilitation credit but is not located within the proposed wetland planting zone. Also, was the area between this linear feature and Reach 1 (Sta. 105+50 – 108+00) considered for wetland re-establishment?
The planting zones are meant to show planting approaches for the site on a macro scale, at approximately 1/10th acre levels of detail. The planting methods used by project planting crews are not compatible with very small and intricate planting zones. However, the planting list for the buffer planting zone, the zone in which this linear wetland is situated, includes wetland-tolerant species.
The area between the linear wetland feature and Reach 1 (Sta. 105+50 – Sta. 108+00) was not requested for wetland re-establishment credit because the area is significantly higher than the surrounding ground.
8. Figure 10 – See mark-up of DWR’s requested groundwater well gauge location shifts.
The three groundwater well gauges have been moved based on DWR’s request.
9. Appendix 3 – On the provided map, please include all gps soil check points within and outside of the delineated hydric soil areas in substantiation of the site investigation. Three soil borings are not sufficient for a detailed baseline report of an 18-acre assessment area.
GPS points were not collected at all soil check points. GPS points were collected at each vertex of the “Hydric Soils” polygon. Multiple observations were made along transects to locate the hydric soil boundary at each vertex. The three profile descriptions and corresponding locations indicated on the map are intended to represent typical soil profiles within the assessment area.
10. Design Plans – Please show the CE line on all plan view sheets using the assigned legend icon.
The CE boundary lines shown on plan sheets have been updated to match the legend on plan sheet 0.3.
11. Sheet 1.05 – Regarding the lunker structure, DWR is ok with trying new bank stabilization techniques. However, we are a bit concerned about the proposed location adjacent to a wetland with the potential lateral hydrologic migration impacting structure stability.
The proposed lunker structure adjacent to the existing wetland (Sandy Branch Reach 2, Sta. 125+53) has been replaced by proposed brush toe.
12. Sheet 1.08 – An existing culvert crossing of UT1 is proposed to be removed near the eastern easement boundary. Please confirm whether livestock will need to continue to cross UT1 to access pasture area. If so, DWR would like to see a ford or culvert crossing constructed adjacent to the easement to protect UT1 as it enters the project area.
Livestock will need to continue to cross UT1 to access pasture area. A new culvert crossing is planned for UT1 at approximately 190 linear feet upstream of the easement boundary. This proposed crossing is shown on plan sheet 1.08.
13. Sheets 4.0-4.02 – DWR appreciates the inclusion of a fencing plan with approximated gate locations.
Thank you.

USACE Comments, Kim Browning

1. The correct USACE Action ID is SAW-2018-01167. Please correct the cover page.
When submitting the JD package to the USACE county project manager, please reference the established Action ID (issued during the Public Notice) to prevent multiple IDs being assigned. The NWP cannot be authorized if the impacts are not associated with the correct Action ID.
The USACE Action ID has been corrected on the mitigation plan and on the plan set.



2. Section 4.0: Regarding DWR's comment #1, the project easement does not appear to have had any recent clearing or channelization; however, UT2 may have impacts due to recent upstream clearing (in 2008 and 2017). It also appears that crossings may have been installed upstream of UT2, and portions of that reach may have been straightened. While these activities did not occur within the proposed easement, they do appear to be on the same property parcel. Authorization of the NWP has the potential to be halted if there are potential violations on the parcel.

See response to DWR comment #1, above.

3. Section 8.7.2: It would be beneficial to add some coarse woody debris to the depressional areas in the buffers and throughout the adjacent wetlands for habitat, and to help store sediment, increase water storage/infiltration, and absorb water energy during overbank events.

Thank you for the suggestion. This feature will be incorporated during construction.

4. Section 8.8: Please discuss how fescue will be treated within the buffer establishment area.

Fescue will be chemically treated and then mechanically ripped to a depth of 18 inches.

5. When submitting the PCN, please include an estimate of the number of trees, or acres, to be cleared for the NLEB 4(d) Rule.

The PCN will include an estimate of the number of trees or acres to be cleared.

6. Section 9.2: Please add a vigor standard of seven feet in height for MY5.

The height requirement for MY5 has been added.

7. Table 17: Performance standard 9.1.3 discusses sampling channel substrate material. This section should reference which goal this is tied to. Additionally, will the performance standard be set specific substrate size, or simply monitor coarser materials in riffles and smaller particles in pools over the monitoring period?

"Reachwide pebble counts" was added to Table 17 as a monitoring metric for the goal "improve stream channel stability." The performance standard for the monitoring metric "reachwide pebble counts" will be the presence of coarser material in riffles and finer material in pools over the monitoring period. This performance standard has been added to Table 17.

8. Design Sheet 2.0: Please cap the planting of green ash to 5% for the Priority 1 floodplain and wetland planting zones.

Green Ash has been removed from the planting zones.

9. During the IRT site visit in 2018, drainage tile shards were found in UT1. Please discuss existing drainage and tile locations.

After further investigation, it is believed that the pieces of ceramic debris found in UT1 are remnants of an old culvert. We plan to explore several additional areas during construction when equipment is available.

10. USFWS responded that their letter from Nov. 8, 2018 would still be applicable. (attached)

Thank you.

If you have any questions please contact me at jhutton@wildlandseng.com, (919)851-9986 x 102.

Sincerely,

A handwritten signature in blue ink, appearing to read "John Hutton".

John Hutton Project Manager



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Appendix 4	Jurisdictional Determination and Wetland Assessment Forms
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1.0 Introduction

The Sandy Branch Mitigation Site (Site) is in Chatham County, NC, approximately seven miles southeast of Siler City, NC (see Figure 1). The project involves re-establishing a stream and wetland complex utilizing stream restoration, wetland re-establishment, and wetland rehabilitation approaches. The Site is located within the DMS Targeted Local Watershed (TLW) for the Cape Fear River Basin Hydrologic Unit Code (HUC) 03030003070050 (Bear Creek TLW) and the NC DWR Subbasin 03-06-12. The Sandy Branch Mitigation Site is one of the projects identified in the Upper Rocky River Local Watershed Plan (Table 3-1 in the report identifies it as Site No. 5) as a priority for stream and wetland restoration. The Site (see Figure 2) was selected by DMS to provide stream mitigation credits and wetland mitigation credits in the Cape Fear River Basin 03030003 (Cape Fear 03).

The project streams total 3,304 existing linear feet of incised and straightened streams on Sandy Branch and two unnamed tributaries to Sandy Branch (UT1 and UT2). Wetland re-establishment and rehabilitation total 8.593 acres. Restoration of these streams and adjacent wetlands will provide 3,286.000 SMUs and 7.267 WMUs. The Site will be protected by an 18.10-acre conservation easement. The Site Protection Instrument detailing the easement is in Appendix 1. General project information is shown in Table 1, below.

Table 1: Project Attribute Table

Project Name	Sandy Branch Mitigation Site
County	Chatham
Project Area (acres)	18.10
Project Coordinates (latitude and longitude)	35°38'35"N 79°23'14"W
Planted Acreage (acres of woody stems planted)	15.87

2.0 Watershed Approach and Site Selection

Wildlands has identified this site for the development of a stream and wetland mitigation project to provide mitigation to compensate for impacts to Waters of the United States and/or State Waters within the service area. In searching for potential mitigation sites in the Cape Fear 03 watershed, Wildlands first did a GIS desktop search focusing on sites located in local watershed planning areas, sites in drinking water supply watersheds, sites adjacent or downstream of other protected properties, sites with 303d listed streams, sites with mapped hydric soils, and sites with long stream reaches with restoration potential. Factors considered in reviewing streams were the stream size (with preference towards headwater streams), lack of vegetative buffers, presence of livestock in streams, high stream length on as few parcels as possible, and signs that streams had been altered or re-aligned manually prior to 1992. After the desktop search, landowners were contacted for the sites with the highest potential to identify interest in the project. Initial site walks and feasibility studies were performed on sites with interested parties. Wildlands and the landowner then entered into an option agreement for the restoration of the highest priority site.

Sandy Branch flows through the Site, where it captures flow from two unnamed tributaries (UT1 and UT2). Sandy Branch continues past the Site and flows into Bear Creek, then the Rocky River, and eventually the Deep River. The 2009 Cape Fear River Basin Restoration Priorities' (RBRP) Cataloging Unit (CU)-wide functional objectives as well as the TLW goals identified the provision of habitat for the endangered mussel population (creeper, Atlantic pigtoe, brook floater and notched rainbow) and the Cape Fear Shiner as a primary goal. Improving water quality is listed as one of the necessities for achieving this goal.



The Site is located upstream of the Bear Creek (Chatham) Aquatic Habitat, a Significant Natural Heritage Area that is located at the confluence of Bear Creek and Sandy Branch (see Figure 1). The Bear Creek Aquatic Habitat flows directly into the Upper Rocky River Aquatic Habitat which flows to the Lower Rocky River/Lower Deep River Aquatic Habitat. The Site is approximately 2.75 miles upstream of the Natural Heritage Area and contains one of the largest cattle farms and the longest length of unbuffered stream in the Sandy Branch watershed.

Implementation of this project will address the Cape Fear 03 CU-wide goals by implementing several of the management strategies outlined in the summary of findings for the Local Watershed Plan (LWP), including the restoration of riparian buffers, stream restoration, wetland restoration, and livestock exclusion. This project will reduce sediment and nutrient loading, improve instream habitat, improve terrestrial (riparian and wetland) habitat, improve stream stability, and improve hydrologic function. Reconnecting the streams to their historic floodplains and restoring riparian buffers and wetlands will enhance the ability of the Site to retain and remove nutrients and cattle waste from adjacent and upstream sources before they can be transported downstream into the Bear Creek Aquatic Habitat and the Critical Habitat Area for the Cape Fear Shiner on the Rocky River and the Deep River.

3.0 Baseline and Existing Conditions

The project watershed (see Table 2 and Figure 3) is in a north-central HUC of the Cape Fear 03. It is situated in the rural countryside southwest of Chapel Hill in Chatham County. The following sections describe the existing conditions of the watershed and watershed processes, including disturbance and response.

Table 2: Project Watershed Attribute Table

Physiographic Province	Piedmont
Ecoregion	Carolina Slate Belt
River Basin	Cape Fear
USGS HUC (8-digit, 14-digit)	03030003, 03030003070050
NCDWR Subbasin	03-06-12
Project Drainage Area (acres)	463
Project Drainage Area Percentage of Impervious Area (2011)	1.5%
CGIA Land Use Classification (2011)	49% Cultivated Crops and Hay, 36% Forested, 13% Developed, 1% Shrubland, 1% Grassland/Herbaceous

3.1 Existing Site Conditions

The Site is on a single parcel bounded by Elmer Moore Road on the northern edge and other agricultural parcels to the east, south, and west. It is an active livestock operation characterized by extensively grazed pasture, minimal riparian vegetation, and existing streams functioning as the primary water source for livestock. Wildlands has visited the Site several times since 2013 and has confirmed this land management practice. The streams and riparian buffers onsite have been in their approximate configurations since before 1965, according to historical aerial photographs (see Appendix 2).

3.2 Landscape Characteristics

3.2.1 Physiography and Topography

The Site is in the Piedmont Physiographic Province of North Carolina. The Piedmont is characterized by gently rolling, well-rounded hills with long, low ridges and elevations ranging from 300-1,500 feet above sea level. The Site topography and relief are typical for the province, as illustrated in Figures 3 and 4.

Watershed elevations range from 460 to 610 feet above sea level. Sandy Branch is in an unconfined alluvial valley ranging from 170 to 370 feet in width and 1.1% to 1.2% in slope. The UT1 alluvial valley is unconfined with a width of more than 240 feet and a slope of 1.6%. UT2 is in an unconfined alluvial valley of 40 to 100 feet in width with a 0.84% slope.

3.2.2 Geology and Soils

The Site is in the Carolina Slate Belt, which consists of metamorphosed sedimentary and volcanic rock. Specifically, the Site is located within metamudstone and meta-argillite geology (CZmd) interbedded with metasandstone, metaconglomerate, and metavolcanic rock of the late Proterozoic-Cambrian Period (NCGS, 1985). The presence of colluvium in the project area provides inputs to bed material over time via streamflow into the project reaches from offsite. The presence of shallow bedrock and bedrock outcroppings help control grade on the Site. These geologic features indicate that substrate will likely be available for use in instream structures during project construction.

The geology of this area has important effects on site hydrology. Rocks comprising much of the Carolina Slate Belt are among the lowest water-yielding units in North Carolina (Daniel, 1989). Consequently, low flows are lower than other areas of the state (the median 7Q10 value in the Carolina Slate Belt is 0.005 ft³/s/mi²). Of all regions of the state, the Carolina Slate Belt has among the lowest potential for sustaining baseflow in streams (Giese and Mason, 1993).

The proposed project area is mapped by the Chatham County Soil Survey (see Figure 5). Most soils within the project area are mapped as Cid-Lignum complex, with one small unit mapped as Nanford-Badin complex along the eastern conservation easement boundary. Descriptions of each soil series are in Table 3, below.

Table 3: Project Soil Types and Descriptions

Series Name	Description
Cid	The Cid series is a slowly permeable and moderately well-drained or somewhat poorly-drained soil typically found on interstream divides, lower side slopes, and surrounding heads of drainageways.
Lignum	Lignum soils have very slow permeability and are moderately well to somewhat poorly drained. This series is typically located within depressions in uplands, interstream divides, and arounds heads of drainageways.

Source: Chatham County Web Soil Survey

A team of licensed soil scientists conducted a detailed hydric soil investigation onsite. Details of this study are discussed in Section 3.5.2 and provided in Appendix 3.

3.3 Land Use/Land Cover

Aerial photos of the Site and surrounding area from 1965 to 2018 were reviewed for changes in land use and land cover. The land use and land cover patterns in this area (see Table 4, below) stayed relatively consistent over that time period. Agricultural fields upstream of the project area have remained the same, with the exception of the area around UT2 described below, while the agricultural fields along the lower east side of the project area have expanded. In 2007, NC Highway 421 expanded to a four-lane highway to the north and east of the Site.

The landowner conducted some tree clearing activities along UT2 upstream of the project in 2007/2008 and again in 2017. The landowner cleared a wooded buffer around the upstream channel in 2007/2008 to create a larger hay field. Figures A and B (See Appendix 2) show this area before and after the clearing. Although the stream and wetland determination for this project did not extend that far upstream, we believe this area would delineate as ephemeral stream channel. Additionally, this portion

of the Cape Fear 03 subbasin does not have riparian buffer rules. A comparison of Figures A and B does not indicate that the stream was channelized during the clearing process.

Additional clearing was conducted downstream of the area described above in 2017. A review of historic aerials showed this area was a farm pond in 1993 (See Figure C, Appendix 2). By 2007 the dam had been breached but the immediate riparian corridor was maintained as cattle pasture without any apparent channel dredging (See Figure D, Appendix 2). The available aerials between 1993 and 2007 are not clear enough to pinpoint the date of dam removal more precisely. The immediate riparian corridor was maintained as cattle pasture up to the point of clearing activities in 2017, so it appears very few, if any, trees were removed within 30 feet of the stream channel.

Finally, the landowner improved a farm road in conjunction with the 2017 clearing along UT2. It is clear in the 2007 aerial (See Figure D, Appendix2) that the landowner maintained this farm road below canopy cover as with the current roads in the woods between the project area and the farmhouse. Overall, it is Wildlands’ opinion that no rules were violated in the 2007/2008 clearing, the 2017 clearing, or the concurrent farm road improvement.

In general, this area has maintained its rural, agricultural character over more than 50 years with only minor changes in land use and land cover. This consistency in land use and land cover within the project watershed indicates that watershed processes affecting hydrology, sediment supply, and nutrient and pollutant delivery have not varied widely over this time period. With a lack of development pressure, watershed processes and stressors from outside the project limits are likely to remain consistent throughout the implementation, monitoring, and closeout of this project. These stressors and processes are discussed further in Section 4.

Table 4: Drainage Areas and Associated Land Use

Reach Name	NCDWR Stream Identification Form Score	Intermittent/Perennial	Watershed Area (acres)	Watershed Area (sq mi)	Watershed Land Use (2011)
Sandy Branch	48.0	Perennial	463	0.72	49% Cultivated Crops and Hay, 36% Forested, 13% Developed, 1% Shrubland, 1% Grassland/Herbaceous
UT1	44.5	Perennial	34.5	0.054	41% Cultivated Crops and Hay, 31% Developed, 28% Forested
UT2	45.5	Perennial	73.1	0.11	50.5% Forested, 46.5% Cultivated Crops and Hay, 2% Developed, 1% Grassland/Herbaceous

3.4 Existing Vegetation

3.4.1 Sandy Branch

The banks of Reach 1 of Sandy Branch are mostly lined with large Chinese privet (*Ligustrum sinense*), dog fennel (*Eupatorium capillifolium*), common buttercup (*Ranunculus acris*), and a variety of pasture grasses. Several medium-size honey locusts (*Gleditsia triacanthos*) and one large American sycamore (*Platanus occidentalis*) are mixed within the Chinese privet. The upstream banks of Reach 2 of Sandy Branch have a five- to ten-foot buffer of Chinese privet with mature common persimmon (*Diospyros virginiana*) throughout. Further downstream, the reach is bordered on the right bank by existing mature hardwood canopy further downstream before reaching the UT2 confluence. The existing canopy includes sweetgum (*Liquidambar styraciflua*), sycamore, shagbark hickory (*Carya ovata*), eastern red



cedar (*Juniperus virginiana*), red maple (*Acer rubrum*), willow oak (*Quercus phellos*), red oak (*Quercus rubra*), white oak (*Quercus alba*), American holly (*Ilex opaca*), honey locust, winged elm (*Ulmus alata*), and multiflora rose (*Rosa multiflora*).

3.4.2 UT1

UT1 banks are dominated by herbaceous vegetation including goldenrod (*Solidago spp.*), *Persicaria spp.*, smartweed (*Polygonum spp.*), dog fennel, pokeweed (*Phytolacca decandra*), bulbous buttercup (*Ranunculus bulbosus*), Japanese stiltgrass (*Microstegium vimineum*), Palmer pigweed (*Palmer amaranth*), lurid sedge (*Carex lurida*), spiranthes, stinging nettle (*Urtica dioica*) and wild petunia (*Ruellia humilis*). Some small tree and shrub species are scattered along the banks, such as Chinese privet, willow oak, and winged elm.

3.4.3 UT2

UT2 is bounded to the left by a canopy of sweetgum, sycamore, shagbark hickory, eastern red cedar, red maple, willow oak, red oak, white oak, American holly, persimmon, and hackberry (*Celtis occidentalis*). Chinese privet, greenbrier (*Smilax rotundifolia*), and honeysuckle (*Lonicera japonica*) are mixed with the hardwoods in this area. The right floodplain of UT2 is active cattle pasture.

3.5 Existing Conditions - Wetlands

3.5.1 Jurisdictional Wetlands

On January 15 and 29, and March 15 and 27, 2019, Wildlands investigated potential waters of the United States within the project area. These areas were delineated using the USACE Routine On-Site Determination method presented in the 1987 Corps of Engineers Wetlands Delineation Manual, the subsequent regional supplement for the Eastern Mountains and Piedmont, and the evaluator's best professional judgement. All jurisdictional resources were located by sub-meter-accurate GPS or conventional survey. The Preliminary Jurisdictional Determination was issued June 17, 2019. Existing wetlands within the project area are summarized in Table 5, below.

There are 13 jurisdictional wetland features located within the project area (see Figure 6). Jurisdictional wetland features onsite exhibit prolonged saturation within the upper 12 inches of the soil profile and a depleted soil matrix. Not all wetlands are dominated by hydrophytic vegetation due to livestock grazing and pasture management. Common vegetation species include bulbous buttercup and tall fescue (*Schedonorus arundinaceus*).

Existing wetland areas were classified and evaluated using the North Carolina Wetland Assessment Method (NCWAM). This rapid assessment method evaluates wetland conditions relative to reference conditions to generate functional ratings for specific wetland types. Existing wetlands were classified as bottomland hardwood forests, headwater forests, and floodplain pools. Overall, wetland ratings range from low to medium, and function ratings are generally low or medium for each wetland function category (hydrology, water quality, and habitat). Wetland functional impairments can be attributed to lack of appropriate vegetation, altered floodplain hydrology, stream incision, and livestock impacts. NCWAM field assessment forms and rating calculator outputs are attached in Appendix 4.



Table 5: Existing Wetland Summary

Wetland Name	A	B	C	D	E
Size of Wetland (acres)	0.328	0.018	1.053	0.058	0.765
Wetland Type (Non-Riparian, Riparian Riverine or Riparian Non-Riverine)	Riparian Riverine	Riparian Riverine	Riparian Riverine	Riparian Riverine	Riparian Riverine
Mapped Soil Series	Cid-Lignum Complex	Cid-Lignum Complex	Cid-Lignum Complex	Cid-Lignum Complex	Cid-Lignum Complex
Drainage Class	SPD or MWD	SPD or MWD	SPD or MWD	SPD or MWD	SPD or MWD
Soil Hydric Status	Predominantly Non-Hydric	Predominantly Non-Hydric	Predominantly Non-Hydric	Predominantly Non-Hydric	Predominantly Non-Hydric
Source of Hydrology	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method (Hydrologic, Vegetative, etc.)	Vegetative	Vegetative	Vegetative	Vegetative	Vegetative, Hydrologic

Wetland Name	F	G	H	I	J
Size of Wetland (acres)	0.037	0.029	0.023	0.203	0.003
Wetland Type (Non-Riparian, Riparian Riverine or Riparian Non-Riverine)	Riparian Riverine	Riparian Riverine	Riparian Riverine	Riparian Riverine	Riparian Riverine
Mapped Soil Series	Cid-Lignum Complex	Cid-Lignum Complex	Cid-Lignum Complex	Cid-Lignum Complex	Cid-Lignum Complex
Drainage Class	SPD or MWD	SPD or MWD	SPD or MWD	SPD or MWD	SPD or MWD
Soil Hydric Status	Predominantly Non-Hydric	Predominantly Non-Hydric	Predominantly Non-Hydric	Predominantly Non-Hydric	Predominantly Non-Hydric
Source of Hydrology	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method (Hydrologic, Vegetative, etc.)	Vegetative	Vegetative, Hydrologic	Vegetative	Vegetative	Vegetative

Wetland Name	K	L	M
Size of Wetland (acres)	1.482	0.129	0.007
Wetland Type (Non-Riparian, Riparian Riverine or Riparian Non-Riverine)	Predominantly Non-Hydric	Predominantly Non-Hydric	Predominantly Non-Hydric
Mapped Soil Series	Cid-Lignum Complex	Cid-Lignum Complex	Cid-Lignum Complex
Drainage Class	SPD or MWD	SPD or MWD	SPD or MWD
Soil Hydric Status	Non-Hydric	Non-Hydric	Non-Hydric
Source of Hydrology	Groundwater	Groundwater	Groundwater
Restoration or Enhancement Method (Hydrologic, Vegetative, etc.)	Vegetative	NA	NA

3.5.2 Relic Hydric Soils

A detailed investigation was conducted by licensed soil scientists (LSS) on February 15, 2019 to determine the extent of hydric soils onsite. The results of this investigation were used to determine wetland re-establishment potential. Areas containing hydric soils but lacking a wetland hydrologic regime were likely functional wetlands prior to agricultural conversion. Hydric soils onsite are most like the poorly drained Worsham series (fine, mixed, active, thermic, Typic Endoaquult). The LSS report and hydric soil map are included in Appendix 3.

3.5.3 Existing Hydrology

More than a full year of groundwater data is available for the Site, but an entire growing season within the same calendar year has not yet been observed. Rainfall quantity was above normal for much of the observation period (see Appendix 5). Areas represented by groundwater wells GW1 and GW2 are existing jurisdictional wetlands and were saturated at or near the soil surface from September 2018 through April 2019. Water table fluctuations were common from May 2018 through August 2018, some of which were over 30 inches. Areas represented by groundwater wells GW2, GW4, and GW5 exhibited prolonged saturation in the upper 12 inches of the soil profile during the dormant season, but continuous hydroperiods were less than 10% during observed portions of the 2018 and 2019 growing seasons. A summary of groundwater well data is provided below in Table 6 and plots are included in Appendix 5. Groundwater well locations are shown in Figure 6.



Table 6: Existing Groundwater Monitoring Gage Data and Analysis Results

Gage (Year)	Consecutive Days in Growing Season with Groundwater Table Above 12 in. Depth (Days)	Consecutive Percent of Growing Season with Groundwater Table Above 12 in. Depth (%)	Record Dates	Proposed Wetland Approach
1 (2018)	69	28.2%	5/5/2018-6/11/2019	Rehabilitation
2 (2018)	13	5.3%	5/5/2018-3/27/2019	Re-Establishment
3 (2018)	69	28.2%	5/5/2018-6/11/2019	Rehabilitation
4 (2018)	13	5.3%	5/5/2018-6/11/2019	Re-Establishment
5 (2018)	23	9.4%	5/5/2018-6/11/2019	Re-Establishment
1 (2019)	86 ¹	35.1%	5/5/2018-6/11/2019	Rehabilitation
2 (2019)	10 ²	4.1% ²	5/5/2018-3/27/2019	Re-Establishment
3 (2019)	86 ¹	35.1%	5/5/2018-6/11/2019	Rehabilitation
4 (2019)	15	6.1%	5/5/2018-6/11/2019	Re-Establishment
5 (2019)	23	9.4%	5/5/2018-6/11/2019	Re-Establishment

1. Groundwater table was above 12 in. soil depth for entire recorded duration of 2019 growing season.

2. Well malfunctioned beginning 3/27/19.

3.6 Existing Conditions - Streams

The Site includes three perennial streams: Sandy Branch, UT1, and UT2. Stream assessments were conducted by Wildlands on January 29th, 2019. NC DWR Stream Identification Forms (Version 4.11) and NC Stream Assessment Method (NC SAM) forms are included in Appendix 6. Stream features are described in detail below. Table 7 provides a summary of existing stream conditions within the project limits. Existing conditions are illustrated in Figure 6.

3.6.1 Sandy Branch

Sandy Branch flows onto the Site from the north, through a culvert under Elmer Moore Road. Active cattle pasture surrounds the stream on both sides for most of its length.

Reach 1 of Sandy Branch, upstream of the confluence with UT1, has been straightened but incision has been prevented due to shallow bedrock. The bank height ratio at the surveyed cross section (XS1; see Appendix 7) is 1.0. The stream exhibits a width-to-depth ratio of 6.3 and an entrenchment ratio greater than 10. Both banks are eroded throughout the reach from livestock crossing and wallowing. Reach 1 of Sandy Branch most closely resembles an E4/F4 stream and is hydrologically connected to its floodplain for most of its length. Reach 1 scored an overall rating of “low” for stream function based on NC SAM calculations.

Reach 2 of Sandy Branch begins at the confluence with UT1. This reach has several livestock ford crossings and wallow areas along its length that have led to trampled streambed and banks. Bank height ratios range from 1.8 to 2.4 and entrenchment ratios range from 1.5 to 3.7 at the surveyed cross sections (XS3, XS5, and XS8; see Appendix 7). Width-to-depth ratios range from 4.7 to 8.4. This reach has high incision and minimal bank vegetation and is classified as an F4 stream type. As with Reach 1, most of Sandy Branch Reach 2 is in Stage III (Degradation) of the Simon Channel Evolution Model, where the channel has been modified and incision is slowly occurring (Simon, 1989). The NC SAM rating for Sandy Branch Reach 2 was “low.”

3.6.2 UT1

UT1 flows from a wooded area to the northeast of the Site. Beginning at a failing farm culvert crossing, the project reach flows southwest for approximately 100 linear feet before discharging into Sandy Branch. A severe headcut has been prevented from migrating upstream due to the culvert crossing, which is mostly clogged and is effectively a dam. Surrounded by cattle pasture, UT1 is narrow and incised throughout most of its length within the project area. The bank height ratio at the surveyed cross section (XS2; see Appendix 7) is 2.9, and the stream is actively downcutting to meet an incised section of Sandy Branch. UT1 has width-to-depth and entrenchment ratios are 5.2 and 3.7, respectively. Both banks are actively eroding due largely to livestock impacts and lack of streambank vegetation. There is low bedform variability throughout and the reach is in Stage III (Degradation) of the Simon Channel Evolution Model. Within the project area, UT1 most closely resembles an E4/F4 stream type. The UT1 NC SAM rating was “low.”

3.6.3 UT2

UT2 flows onto the Site from a wooded area to the northwest and continues for approximately 260 linear feet before flowing into Sandy Branch. UT2 is bounded to the left by mature hardwoods and to the right by cattle pasture. The roots of a large sweetgum near the upper end of the project reach have stabilized the upstream section of channel by preventing an existing, severe headcut from continuing upstream. UT2 is highly incised for much of its length, with an estimated bank height ratio of 2.5 at the surveyed cross section (XS7; see Appendix 7). The width-to-depth ratio is 2.1 and the entrenchment ratio is 2.2. The entire length of stream within the project area is actively incising with heavily eroded banks and evidence of livestock trampling. UT2 is an F4 stream type and, as with the other project streams, is in Stage III (Degradation) of the Simon Channel Evolution Model (Simon, 1989). The NC SAM rating for UT2 was “low.”



Table 7: Stream Resources

Stream Name	Sandy Branch Reach 1	Sandy Branch Reach 2	UT1	UT2
Length of Reach (LF)	1014	1931	102	257
Valley Width (ft)	200 - 310	170 - 370	> 240	40 - 100
Valley Confinement (Confined, Moderately Confined, Unconfined)	Unconfined	Unconfined	Unconfined	Unconfined
Drainage Area (acres)	323	388 - 463	34.5	73.1
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial
NCDWR Water Quality Classification	C, NSW	C, NSW	C, NSW	C, NSW
Stream Classification ¹	E4/F4	F4	E4/F4	F4
Evolutionary Trend (Simon (1989))	Stage III: Degradation	Stage III: Degradation	Stage III: Degradation	Stage III: Degradation
FEMA Classification	NA	NA	NA	NA
NC SAM Stream Function	Low	Low	Low	Low

1. The Rosgen classification system (Rosgen, 1994) is for natural streams. These channels have been manipulated by humans and livestock and therefore may not fit the classification category as described by this system. Results of the classifications are provided as a basis for discussion of existing channel form.

4.0 Watershed and Channel Disturbance and Response

As discussed above in Section 3.3, there has been very little change in the watersheds of the project reaches for several decades. The only significant change has been the widening of US Highway 421 from two lanes to four lanes in 2006 and 2007. Most of the stream degradation within the Site appears to be a result of the original conversion of the riparian corridor to pastureland, which involved clearing and channelization of the project streams. This conversion occurred prior to the 1960s (the decade of the earliest available aerial photo) and involved straightening and deepening of the streams. Multiple ditches were also cut through wetland areas, draining historic wetlands. This manipulation resulted in degraded terrestrial and aquatic habitats, denuded riparian zones, limited overbank flood events, lowered local water table, and degraded wetland function. It also led to increased shear stress in the stream channels which likely led to degradation of the channels over time. Signs of ongoing bank erosion are apparent throughout the project reaches. The project reaches are severely incised, over-widened, and have active lateral erosion. Some areas that were previously wetlands have been drained and the hydrophytic vegetation has been removed.

5.0 Functional Uplift Potential

5.1 Wetland Functional Uplift Potential

Areas proposed for wetland re-establishment currently do not provide functions associated with wetlands. Wetland areas proposed for rehabilitation currently provide some significantly diminished functionality. Functional uplift to existing wetland areas is expected as a result of the proposed activities within the Site. Construction of appropriately sized stream channels will raise the water table and increase hydrologic interaction with floodplains. This will restore the hydrology of adjacent wetland areas. Wetland rehabilitation and re-establishment areas will be planted with native vegetation like that found in nearby forested headwater wetlands. These activities will result in uplift of various wetland



functions including increased water storage and groundwater recharge, water quality treatment, and improved wildlife habitat.

5.2 Stream Functional Uplift Potential

This project offers an excellent opportunity for ecological uplift with low risk of failure. The main stressors on the Site are cattle access to streams, lack of riparian buffers, runoff from agricultural fields, and historic channelization of streams. These stressors have led to degraded aquatic habitat, erosion of streambanks, headcutting and disconnection of streams from floodplain wetlands, water quality problems such as sediment and bacteria entering the system from channel erosion and pasture runoff, increases in water temperatures, and decreased dissolved oxygen levels. These problems will be reduced or eliminated through the following practices:

- Restoring degraded stream channels to reduce erosion and reconnect streams to riparian wetlands.
- Eliminating bank erosion and associated pollutants.
- Providing grade control in streams to eliminate headcutting.
- Planting riparian buffers to shade streams, help stabilize streams, and filter runoff and overbank flows.
- Excluding livestock.
- Protecting the Site with a conservation easement.

These project components are described in Section 7 in terms of goals, objectives, and outcomes for the project and in greater detail in Section 8.

5.3 Site Constraints to Functional Uplift

The Site includes one external easement break to allow access to all portions of the property. The break is summarized in Table 8, below.

Table 8: Easement Breaks and Crossings

No.	Width (ft)	Location	Internal or External	Crossing Type
1	40	Sandy Branch Reach 1	External	Culvert - New Construction

All streams proposed for mitigation credit provide the required 50-foot minimum riparian buffer for Piedmont streams. The entire easement area can be accessed for construction, monitoring, and long-term stewardship from a farm road off Elmer Moore Road.

The flat topography of the Site will allow for the development of pattern and channel dimensions to restore stable, functioning streams. The degree to which the physicochemical and biological functions can improve on the Site is limited by the watershed conditions beyond the project limits, upstream water quality, and the presence of source aquatic communities upstream and downstream of the Site.



6.0 Regulatory Considerations

Table 9, below, summarizes the regulatory considerations for the Site. These considerations are explained in more detail in Sections 6.1-6.3.

Table 9: Regulatory Considerations

Parameter	Applicable?	Resolved?	Supporting Docs?
Water of the United States - Section 404	Yes	No	PCN ¹
Water of the United States - Section 401	Yes	No	PCN ¹
Endangered Species Act	Yes	Yes	Appendix 8
Historic Preservation Act	Yes	Yes	Appendix 8
Coastal Zone Management Act	No	NA	NA
FEMA Floodplain Compliance	No	NA	NA
Essential Fisheries Habitat	No	NA	NA

1. PCN to be provided to DMS with Final Mitigation Plan.

6.1 Biological and Cultural Resources

A Categorical Exclusion for the Sandy Branch Mitigation Site was approved by the Federal Highway Administration (FHWA) on October 1, 2018. This document included investigation into the presence of threatened and endangered species onsite protected under The Endangered Species Act of 1973, as well as any historical resources protected under The National Historic Preservation Act of 1966. Per the new standard from the US Fish and Wildlife Service Raleigh Office, Wildlands submitted the Sandy Branch Mitigation Site Self-Certification Letter. USFWS had no comment during the 30-day review period. All correspondence with USFWS and a list of Threatened and Endangered Species in Chatham County, NC is included in the Categorical Exclusion (see Appendix 8). An EDR Radius Map Report with Geocheck identified “The Old Place,” a catering operation that uses a permitted well as their water supply. The well is located within the project parcel but is outside of the conservation easement. Due to the type of database in which the well was listed and the location outside of the project site, it was determined that there is no evidence of any “recognized environmental condition” in connection with the target property. The State Historic Preservation Office was contacted regarding onsite cultural resources. The State Historic Preservation Office indicated that they were aware of “no historic resources which would be affected by the project.”

6.2 FEMA Floodplain Compliance and Hydrologic Trespass

Sandy Branch and its tributaries are not FEMA-mapped within the Site, as illustrated on the Chatham County Flood Insurance Rate Map Panel 8688. Therefore, no modeling will be required for this project.

The Site is in an area where implementation of the project will not result in any hydrologic trespass.

6.3 401/404

As part of the existing conditions assessment of the Site, Wildlands documented and classified the onsite wetlands. Classifications were applied based on wetland function and potential for wetland improvement through the stream design approach. Based on these classifications, Wildlands used this information to prioritize higher quality wetlands for avoidance and incorporated stream design approaches to improve hydrologic and vegetative conditions of impaired wetlands. Wetlands within the conservation easement and/or limits of disturbance will be shown in the final construction plans and described in the project specifications. Floodplain grading will result in temporary impacts to wetlands while channel realignment will result in permanent impacts. A net gain of wetland area and function as a result of restoring stream channels to their appropriate sizes is expected. Table 10, below, shows the



estimated impacts to wetland areas. The Pre-Construction Notification, including these data, will be provided with the Final Mitigation Plan.

Table 10: Estimated Impacts to Wetlands

Jurisdictional Feature	Classification	Wetland Area (acres)	Permanent (P) Impact		Temporary (T) Impact	
			Type of Activity	Impact Area (acres)	Type of Activity	Impact Area (acres)
Wetlands A-M	Riparian Riverine	4.158	Channel Realignment	0.07	Floodplain Grading	0.10

7.0 Mitigation Site Goals and Objectives

The project will improve stream function, as described in Section 5, through stream restoration and riparian buffer re-vegetation. Project wetlands will be re-established and rehabilitated. The project goals and associated objectives and outcomes are described in Table 11, below. Project goals are desired project outcomes and are verifiable through measurement and/or visual assessment. Project objectives are activities that will result in the accomplishment of project goals. The project will be monitored after construction to evaluate performance as described in Section 10 of this report.



Table 11: Mitigation Goals and Objectives

Goal	Objective	Expected Outcomes
Improve stream channel stability.	Reconstruct stream channels that will maintain stable pattern and profile, considering the hydrologic and sediment inputs to the system, the landscape setting, and the watershed conditions.	Reduce and control sediment inputs. Contribute to protection of, or improvement to, a Nutrient-Sensitive Water.
Improve instream habitat.	Install habitat features such as constructed riffles, lunger logs and structures, and brush toe into restored streams. Add woody material to channel beds. Construct pools of varying depth.	Improve aquatic communities in project streams.
Reconnect channels with floodplains and riparian wetlands.	Reconstruct stream channels with appropriate bankfull dimensions and depths, relative to the existing floodplain.	Reduce shear stress on channels, hydrate adjacent wetland areas, and filter pollutants from overbank flows.
Restore wetland hydrology, soils, and plant communities.	Re-establish and rehabilitate riparian wetlands by raising stream beds and planting native wetland species.	Improve terrestrial habitat. Contribute to protection of, or improvement to, a Nutrient-Sensitive Water.
Restore and enhance native floodplain vegetation.	Plant native tree species in riparian zones where currently insufficient.	Reduce and control sediment inputs, reduce and manage nutrient inputs, provide a canopy to shade streams and reduce thermal loadings, contribute to protection of, or improvement to, a Nutrient-Sensitive Water.
Permanently protect the Site from harmful uses.	Establish a conservation easement on the Site.	Prevent development and agricultural uses that would damage the Site or reduce the benefits of the project.

8.0 Design Approach and Mitigation Work Plan

8.1 Design Approach Overview

The design approach for the Site was developed to meet the goals and objectives described in Section 7, which were formulated based on the potential for uplift described in Section 5. While the design is intended to provide the expected outcomes in Section 7, these are not tied to performance criteria. The project streams will be reconnected with their floodplains and will be reconstructed with stable dimension, pattern, and profile in order to transport water and sediment delivered to the system. Adjacent wetlands will be re-established or rehabilitated by raising streambeds to increase groundwater levels. The floodplains and wetlands will be planted with native tree species where necessary. Instream structures will be constructed to help maintain stable channel geometry and improve aquatic habitat. The entire project area will be protected in perpetuity by a conservation easement.

The design approach for the Site utilizes a combination of analog and analytical approaches for stream restoration. Reference reaches were identified to serve as the basis for stream design parameters. Channels were sized based on a design discharge analysis and designs were then verified based on a



sediment transport analysis. This approach has been used on many successful Piedmont and Slate Belt restoration projects and is appropriate for the goals and objectives of the Site.

8.2 Reference Streams

Reference streams provide geomorphic parameters of a stable system, which can be used to inform design of stable channels of similar stream types in similar landscapes and watersheds. A total of seven reference reaches were identified for the Sandy Branch Mitigation Site and were used to support the design of the project streams (see Figure 7). Project streams were separated into two groups, Sandy Branch and UT2 in one group and UT1 in the other, based on important design factors such as drainage area and channel slope. Four reference reaches were selected to help develop design parameters for Sandy Branch and UT2, while a set of one shared and three unique reference reaches were used for UT1. Four of the seven reference reaches were used in the design discharge analysis to strengthen the reference reach discharge-drainage area curve (described in Section 8.4, below). The reference reaches are all located within the Piedmont region of North Carolina. Geomorphic parameters for these reference reaches are summarized in Appendix 9. The references used for specific streams are shown in Table 12 and a description of each reference reach is included below.

Table 12: Stream Reference Reaches Used for Project Stream Design

Reference Reach Name	Long Branch	UT to Cane Creek	Foust Creek	Spencer Creek 2	Spencer Creek 3	UT to Varnals Creek	UT to Wells Creek
Stream Type	C4/E4	C4/E4	C4	E4	E4	E4	C4/C1
Parameters Used for Sandy Branch Reach 1	Q, Dimension, Pattern, Profile	Q, Dimension, Pattern, Profile	Q, Dimension, Pattern, Profile	Profile	-	-	-
Parameters Used for Sandy Branch Reach 2	Q, Dimension, Pattern, Profile	Q, Dimension, Pattern, Profile	Q, Dimension, Pattern, Profile	Profile	-	-	-
Parameters Used for UT1	-	Q, Dimension, Pattern, Profile	-	-	Pattern	Profile	Q, Dimension, Pattern, Profile
Parameters Used for UT2	Q, Dimension, Pattern, Profile	Q, Dimension, Pattern, Profile	Q, Dimension, Pattern, Profile	Profile	-	-	-

8.2.1 Long Branch

Long Branch is in central Orange County, NC approximately 4 miles northwest of the Community of Eubanks. This site was classified as a C4/E4 stream type and has a drainage area of 1.5 square miles. This reach flows through a mature forest and has a channel slope of 0.40%. The d_{50} for the reach is 42 mm.

8.2.2 UT to Cane Creek

UT to Cane Creek is in southern Alamance County, NC. This stream is classified as a C4/E4 stream type and has a drainage area of 0.28 square miles. This reach flows through a mature forest and has a channel slope of 0.46%. The morphological parameters reported for the riffle cross section include a width-to-depth ratio range of 7.9 to 13 and an entrenchment ratio greater than 4.6.

8.2.3 Foust Creek

The Foust Creek reference reach is approximately 600 linear feet upstream of the Foust Creek Mitigation Site in Alamance County, NC. The Foust Creek reference reach has a drainage area of 1.4 square miles, a valley slope of 0.95%, and a channel slope of 0.90%. The reach is classified as a C4 stream type and has a d_{50} of 61 mm. This reach flows through a mature forest and, although it is stable, lacks sinuosity.

8.2.4 Spencer Creek 2

Spencer Creek 2 is in central Montgomery County, NC. This reach is classified as an E4 stream type and has a drainage area of 0.96 square miles. This reach flows through a mature forest and has a valley slope of 1.1% and a channel slope of 0.47%. The d_{50} for the reach is 8.8 mm.

8.2.5 Spencer Creek 3

Spencer Creek 3 is in central Montgomery County, NC. This reach is classified as an E4 stream type and has a drainage area of 0.37 square miles. This reach flows through a mature forest and has valley slopes of 2.2% to 3.1% and channel slopes of 1.9% to 2.2%. The d_{50} for the reach is 11 mm.

8.2.6 UT to Varnals Creek

The UT to Varnals Creek reference reach is in south-central Alamance County, NC. This reference stream has a drainage area of 0.41 square miles and is classified as an E4 stream type. It has a valley slope of 2.0% and a channel slope of 1.7%. The d_{50} of this stream is 8.0 mm.

8.2.7 UT to Wells Creek

The UT to Wells Creek reference reach is in Alamance County, NC with a drainage area of 0.13 square miles. It is a C4/C1 stream type with width-to-depth ratios from 6.1 to 13 and entrenchment ratios from 1.9 to 4.1.

8.3 Design Channel Morphological Parameters

Reference reaches were a primary source of information used to develop pattern and profile design parameters for the streams. Ranges of pattern parameters were developed within the reference reach parameter ranges, with some exceptions based on best professional judgement and knowledge from previous projects. The lower limits of some of these parameters were too low to build a stable system. This is likely due to the presence of mature forests and root systems that both influence and stabilize reference reach pattern and profile. For example, radii of curvature ratios in reference data have a lower limit of 0.57 and the meander width ratios have a minimum of 1.0. However, we have found that for C/E channel designs, these ratios should typically be above 1.8 and 2.4, respectively, to naturally dissipate energy through meander bends during high flow events to limit impacts of shear stress on streambanks. The lower limits of the design radii of curvature ratios and meander width ratios are based on values used for many years and on many successful designs.

Reference reaches were used to inform the design of the stream cross sections. The streams were designed with pool widths to be approximately 1.4 times the width of riffles to provide space for point bars and riffle-pool transition zones. Pools were designed to be 3.3 to 3.5 times deeper than riffles to provide habitat variation. Cross section parameters such as area, depth, and width were designed based on the design discharge and stable bank side slope values. Key morphological parameters for the Site are listed in Tables 13 and 14, below. Complete morphological tables for existing and proposed conditions can be found in Appendix 9.



Table 13: Summary of Morphological Parameters for Sandy Branch and UT2

Parameter	Existing Parameters			Reference Parameters				Proposed Parameters		
	Sandy Branch Reach 1	Sandy Branch Reach 2	UT2	Long Branch	UT to Cane Creek	Spencer Creek 2 (Profile Only)	Foust Creek	Sandy Branch Reach 1	Sandy Branch Reach 2	UT2
Valley Width (ft)	200 - 310	170 - 370	40 - 100	-	95	-	-	200 - 310	170 - 370	40 - 100
Contributing Drainage Area (acres)	323	388 - 463	73.1	950	180	610	900	323	388 - 463	73.1
Channel/Reach Classification	E4/F4	F4	F4	C4/E4	C4/E4	E4	C4	C4	C4	C4
Bankfull Width (ft)	6.6	7.3 - 11	2.9	15 - 19	8.2 - 12	11	19	14.0	16.0	9.00
Bankfull Depth (ft)	1.0	1.2 - 1.6	1.4	1.3 - 2.1	0.90 - 1.0	1.6 - 1.8	1.2 - 1.3	0.945	1.10	0.722
Bankfull Area (ft ²)	6.6	9.1 - 14	4.1	25 - 35	8.5 - 11	18 - 20	24	13.2	17.5	6.50
Bankfull Discharge Velocity (ft/s)	3.4	2.6 - 3.5	3.7	3.6 - 4.0	2.4 - 5.0	4.9 - 5.4	2.9 - 3.7	3.26	2.81 - 3.11	2.57
Bankfull Discharge (cfs)	22	29 - 39	15	100 - 120	21 - 53	97	88 - 95	44.0	51.0 - 58.0	16.0
Channel Slope (%)	1.0 - 1.4	0.41 - 0.90	0.84 - 1.4	0.40	0.46	0.47	0.90	0.171 - 1.08	0.443 - 2.41	0.364 - 2.51
Sinuosity	1.1	1.2	1.1	1.3	1.2	2.3	1.1	1.16	1.27	1.09
Width-to-Depth Ratio	6.5	4.7 - 8.4	2.1	7.9 - 14	7.9 - 13	5.8 - 7.1	14 - 16	14.8	14.6	12.5
Bank Height Ratio	1.0	1.8 - 2.4	2.5	1.2 - 1.5	1.0	1.0	1.0	1.00	1.00	1.00
Entrenchment Ratio	> 9.1	1.5 - 3.7	2.2	> 3.4	> 4.6	5.5 - > 10	2.9 - 5.3	> 2.20	> 2.20	> 2.20
d50 (mm)	10	10	-	42	-	8.8	61	10	10	-



Table 14: Summary of Morphological Parameters for UT1

Parameter	Existing Parameters	Reference Parameters				Proposed Parameters
	UT1	Spencer Creek 3 (Pattern Only)	UT to Cane Creek	UT to Varnals Creek (Profile Only)	UT to Wells Creek	UT1
Valley Width (ft)	> 240	130	95	65	70	> 240
Contributing Drainage Area (acres)	34.5	240	180	260	83	34.5
Channel/Reach Classification	E4/F4	E4	C4/E4	E4	C4/C1	C4
Bankfull Width (ft)	3.3	6.3 - 9.3	8.2 - 12	9.3 - 11	6.2 - 8.6	7.00
Bankfull Depth (ft)	0.63	0.80 - 1.0	0.90 - 1.0	1.1 - 1.2	0.56 - 1.0	0.571
Bankfull Area (ft ²)	2.1	6.6 - 8.7	8.5 - 11	10 - 12	3.9 - 6.3	4.00
Bankfull Discharge Velocity (ft/s)	3.8	5.0 - 5.6	2.4 - 5.0	4.4 - 5.2	2.4 - 3.8	2.46
Bankfull Discharge (cfs)	7.7	35	21 - 53	54	15	9.00
Channel Slope %	2.7	1.9 - 2.2	0.46	1.7	2.0	0.320 - 1.98
Sinuosity	1.1	1.0 - 1.3	1.2	1.2	1.4	1.14
Width-to-Depth Ratio	5.2	7.9 - 9.3	7.9 - 13	8.1 - 9.3	6.1 - 13	12.3
Bank Height Ratio	2.9	1.0	1.0	1.0	1.0 - 1.8	1.00
Entrenchment Ratio	3.7	1.7 - 4.3	> 4.6	1.9 - 6.1	1.9 - 4.1	> 2.20
d50 (mm)	-	11	-	8.0	-	-

8.4 Design Discharge Analysis

Multiple methods were used to develop design bankfull discharge estimates for each of the project reaches. The resulting values were compared and concurrence between the estimates and best professional judgment were used to determine the specific design discharge for each reach. The methods used are described below.

8.4.1 Published Regional Curve Data

Bankfull discharge was estimated using the published NC Rural Piedmont Curve (Harman et al., 1999) and the updated NRCS NC Rural Mountain and Piedmont Regional Curve (Walker, unpublished).

8.4.2 Regional Flood Frequency Analysis

A regional flood frequency analysis was performed using 28 USGS gages in the North Carolina Piedmont region, including five gages on streams with drainage areas smaller than 1.0 square mile. The Hosking and Walls (1993) homogeneity test was performed using the statistical software R[®] to identify the most appropriate gages for use in the analysis. Flood frequency regression curves were developed to calculate discharges for ungaged streams in the North Carolina Piedmont region for the 1.0-year, 1.2-year, and 1.5-year recurrence intervals.

8.4.3 Reference Reach Regional Curve

Of the seven total reference reaches identified to develop design data for this project (Section 8.2), four were also used to develop a reference reach bankfull discharge curve. Stable cross-sectional dimensions and channel slopes were used to compute bankfull discharges with the Manning’s equation for each reference reach. The resulting discharge values were plotted with drainage areas and compared to the other discharge estimation methods. Development of the reference reach curve focused on sites with comparable drainage areas, slopes, and dimensions to the project streams.

8.4.4 Design Discharge Analysis Summary

The design discharges for the restoration reaches were developed so that the reconstructed channels will flood with the desired frequency. Results from each of the methods described above were evaluated and compared to the other methods. For this analysis, emphasis was placed on the results from the regional flood frequency 1.2-year event, the NRCS NC Rural Mountain and Piedmont Regional Curve, and the reference reach curve in determination of design discharge. Table 15, below, summarizes the discharge analysis. Figure 8 illustrates the design discharge data analysis.

Table 15: Summary of Design Bankfull Discharge Analysis

		Sandy Branch Reach 1	Sandy Branch Reach 2	UT1	UT2
Drainage Area (acres)		323	388 - 463	34.5	73.1
Drainage Area (sq mi)		0.505	0.606 - 0.723	0.0539	0.114
NC Rural Piedmont Regional Curve (cfs)		54	62 - 70	11	19
Wildlands Regional USGS Flood Frequency Analysis (cfs)	1.0-year event	14	17 - 19	2.2	4.2
	1.2-year event	47	54 - 61	9.0	16
	1.5-year event	67	77 - 87	13	23
NRCS Rural Piedmont and Mountains Regional Curve (cfs)		33	38 - 43	5.6	10
Site-Specific Reference Reach Curve (cfs)		47	53 - 60	10	17
Design Discharge (cfs)		44	51 - 58	9.0	16

8.5 Sediment Transport Analysis

To gain a better understanding of the quantity of sediment supplied to the project streams and how it is transported through the system, Wildlands performed a qualitative assessment of sediment supply and sources in the project watershed. In addition, Wildlands performed a competence analysis to analyze the ability of the proposed streams to transport specific sizes of sediment and to support material sizing for constructed riffles. The following sections detail the sediment supply and competence analysis.

8.5.1 Sediment Supply

The assessment consisted of an analysis of past, current, and projected land cover and sediment sources within the project watershed using the National Land Cover Database (NLCD) and historic and current aerial photography. For a breakdown of land uses, refer to Section 3.3 above. The watershed has had very little development or change in land cover for more than 60 years

The watershed assessment indicated that the watershed is stable, so there is no reason to believe land use will change significantly in the foreseeable future. In addition, visual inspections of streams throughout the Site have not resulted in any evidence of heavy deposition of sediment, indicating that aggradation is not a concern. Because of the rural nature of the watershed, the stable land use, and the lack of sediment accumulation in the project streams, the sediment load to the project streams is

expected to remain low, stable, and supply-limited (i.e. there is capacity to move sediment loads greater than the supplied load). Therefore, the design channels are expected to remain stable and pass the sediment delivered from the watershed. The focus of the sediment transport analysis is therefore based on stream competence.

8.5.2 Competence Analysis

In natural streams, shear stress increases corresponding to an increase in discharge until the point at which the channel is flowing full and gains access to its floodplain. Floodplain access disperses the flow and prevents further increases in shear stress within the channel. This relationship of shear stress, channel dimension, and discharge influences erosion potential within the channel and the channels ability to transport certain sizes of sediment. The latter is a measure of stream competency, which is quantified by shear stress as calculated by the Shields (1936) and Andrews (1984) equation described by Rosgen (2001). The results of the competence analysis are shown in Table 16, below.

Table 16: Results of Competence Analysis

	Existing Conditions	Proposed Conditions
Project Reach	Sandy Branch Reach 1	Sandy Branch Reach 1
D_{bkf} (ft)	1.0	1.0
S_{chan} (ft/ft)	0.0086	0.010
Bankfull Shear Stress, τ (lb/sq ft)	0.47	0.48
D_{50} Bar/Subpavement (mm)	12	30
D_{100} Bar/Subpavement (mm)	64	160
D_{crit} (ft)	0.35	0.30
S_{crit} (ft/ft)	0.0032	0.0030
Movable particle size (mm)	87	88
Predicted Shear Stress to Move D_{100} (lb/sq ft)	0.31	0.31

The initial competence analysis was based on the size material found in the stream in order to mimic potential bed load. The results of the analysis indicate that there will be enough shear stress to move material delivered to the project reaches from offsite. A second competence analysis was done to determine the appropriate D_{50} and D_{100} for constructed riffles. Riffle material was sized so that the reconstructed channels will not produce enough shear stress to entrain the largest particles within these structures. This will ensure a stable pavement while allowing for bed load material to be active within the system.

8.6 Wetland Design

8.6.1 Wetland Design Overview

The project includes wetland rehabilitation and re-establishment components. Areas proposed for wetland rehabilitation are existing jurisdictional wetlands which exhibit substantial impairments to hydrology, water quality, and habitat functions as discussed in Section 3.5.1. Re-establishment is proposed for 2.888 acres that contain hydric soil (see Appendix 3) but lack a wetland hydrology regime (see Appendix 5). It is likely that these areas were fully functional wetlands prior to manipulation for agricultural purposes. Re-establishment is proposed for 1.833 acres that do not contain hydric soil but demonstrate a depleted matrix at depth. The LSS investigation detected presence of some fill material, but this material was not mapped in detail. It is possible that the non-hydric areas proposed for wetland re-establishment were wetlands containing hydric soil at some time in the past and were converted to upland following discharge of spoil material from stream manipulation.



Numerous abandoned stream channel features are present throughout the Sandy Branch floodplain, some of which are existing jurisdictional wetlands. The significance of maintaining these features for habitat diversity is recognized. However, these features function as drainage conduits where they intersect the existing stream channel. Along Sandy Branch Reach 1, it is proposed that these features be maintained except where they intersect proposed stream channels. At these locations, plugs will be constructed in the abandoned channel features to prevent them from providing drainage. Additionally, overburden from past straightening of Sandy Branch will be removed from atop relic hydric soils in this area. Along Sandy Branch Reach 2, wetland hydrology will be restored and improved in proposed wetland re-establishment and rehabilitation areas by raising streambeds and constructing appropriately sized channels. These practices will reduce groundwater drainage gradients, increase water table elevations, and restore inputs from overbank flooding. Remaining impairments to wetland function will be ameliorated by excluding livestock and establishing native hydrophytic vegetation.

8.6.2 Proposed Wetland Hydroperiod

The LSS investigation concluded that hydric soils within the project area are most like the Worsham Series (fine, mixed, active, thermic Typic Endoaquults). The 2016 Wilmington District Stream and Wetland Compensatory Mitigation Update specifies a hydroperiod of 10-12% for this soil series. Recorded hydroperiods were reviewed from the Underwood Mitigation Site, a closed-out mitigation site located in the Carolina Slate Belt with similar mapped soil types and pre-construction conditions. Given similarities between the Underwood Mitigation Site and the Sandy Branch Mitigation Site, a comparable hydrologic response to proposed mitigation activities is expected. While Wildlands wishes to maximize wetland function, a finite influence on hydroperiod is achievable while maintaining appropriate stream dimensions, maintaining appropriate streambed elevations, and minimizing removal of topsoil. A 10% hydroperiod is proposed because it is of adequate duration to drive redoximorphic reactions and favor hydrophytic plant communities. This hydroperiod is feasibly attainable within limitations of a natural restoration approach as evidenced by a previous, successful mitigation project, and within the range documented in mitigation guidance.

8.7 Project Implementation

8.7.1 Stream Restoration

All stream work on the Site will be Priority 1 stream restoration except for a short Priority 2 tie-in at the downstream end of Sandy Branch (see Figure 9). The streambeds will be raised so that bankfull elevations will meet or exceed existing floodplain elevations and cross-sectional dimensions will be constructed to convey the design discharges. Stream pattern will be reconstructed so that Sandy Branch will meander throughout flat areas on the historic floodplain where it likely existed prior to being altered. The project area is typically flat, with average valley slopes ranging from 0.84% to 1.6%, depending on the design reach. Generally, this allows for moderate sinuosity to reflect the relationship between sinuosity and slope observed in reference reaches. Wherever possible, the design alignments were developed to avoid impacts to existing wetlands and to avoid unnecessary removal of existing, native trees.

The restored channel profiles will consist of alternating riffle-pool bed morphology. Pools will be relatively deep to provide diversity in habitat throughout the design reaches. The design channels will be constructed to frequently inundate adjacent floodplains and wetlands and the reconstructed channel banks will be built with stable side slopes, matted, and planted with native vegetation for long-term stability. Most of the proposed stream length weaves between areas made up of existing wetlands and hydric soils. Raising streambeds in these areas will help re-establish wetlands and improve the hydrology of existing wetlands.



A variety of structures will be used to maintain restored bed grades, protect banks, add wood into channels, and provide a variety of habitat types. Five types of constructed riffles are proposed, including angled log riffles, chunky riffles, jazz riffles, native material riffles, and woody riffles. Other types of structures will include log j-hooks, boulder sills, angled log sills, lunger logs, log vanes, constructed wooden lunger structures, transplanted sod mats, brush toe, and boulder toe.

Wildlands has completed several projects within the Carolina Slate Belt and has found that riffle grade control material can be harvested from weathered parent material on valley side slopes to mitigate for the natural lack of grade control. This method, along with the introduction of logs and woody debris, has been successful at providing a heterogeneous mixture of riffle material that increases channel roughness and improves channel hydraulics and geomorphology. The gradation of material provides varied pore spaces within the riffles which benefits hyporheic exchange processes and habitat niche formation.

One culvert crossing will be necessary to maintain access to all portions of the property. It will be located on Sandy Branch Reach 1 within a 40-foot external easement break (see Figure 9).

8.7.2 Wetland Mitigation Activities

This project will include headwater forest wetland re-establishment and rehabilitation. It is likely that much of the Site was historically wetland prior to realignment and channelization of project streams and subsequent lowering of the water table. In areas proposed for riparian wetland re-establishment and rehabilitation, streambeds will be raised such that they restore the natural water table elevations and the natural overbank flooding regime. Wetland areas may be disked to increase surface roughness and better capture rainfall which will improve groundwater recharge. Furrows will not exceed six to nine inches in depth. Other riparian wetlands within the project area will also be planted with native wetland species.

8.8 Vegetation and Planting Plan

The long-term objective of the planting plan is to establish a native riparian buffer composed of species appropriate for the Site. The restored buffer will improve riparian habitat and connectivity to other habitat types, maintain stability of restored streams, provide shade, trap sediment, and provide woody debris and organic matter to streams. Species designated for planting were selected based on compatibility of silvics with expected site conditions within given planting zones, observation of reference communities, and best professional judgement.

The wetland and buffer planting zones will be planted from the tops of bank to the extents of the conservation easement or extents of disturbance where currently forested with bare root seedlings at a maximum spacing of 12 feet. Sandy Branch will be planted with live stakes in a single row along the tops of bank with a linear spacing of four feet on the outside of meander bends and eight feet on both sides of tangent sections. Both sides of tangent sections will also be planted with herbaceous plugs at normal baseflow stage with a linear spacing of four feet. For UT1 and UT2, a single row of live stakes will be planted along the tops of bank and a single row of herbaceous plugs will be planted at normal baseflow stage. Both live stakes and herbaceous plugs will be planted along the entirety of each streambank with a linear spacing of six feet. Permanent seed will be spread on streambanks, floodplain areas, and all disturbed areas within the conservation easement. See Sheets 2.0 and 2.01 of the construction plans in Appendix 13 for the species lists and planting zones layout, respectively.

Mechanical site preparation will be implemented where necessary to create soil conditions favorable for tree growth. In the cattle pasture, especially in dense fescue areas, the area to be planted will be chemically treated and then ripped to a depth of 18 inches in a grid-like pattern with a maximum rip shank spacing of six feet. Ripping will be performed during the driest conditions feasible to maximize



shatter of the plow pan. Construction practices are intended to minimize impacts to soil properties, but some impacts will be unavoidable. Ripping may be implemented to ameliorate soil compaction resulting from haul roads, stockpile areas, etc. Where grading is required, topsoil will be stockpiled and reapplied. Soil amendments may be incorporated to enhance survival and growth of planted vegetation as determined necessary by soil testing.

Most invasive species within the project area will be treated and/or mechanically removed during construction, but additional treatment is expected to be necessary. Invasive species presence will be monitored and treated as necessary throughout the monitoring period. Additional monitoring and management issues regarding vegetation are included in Sections 10 and 11.

8.9 Project Risk and Uncertainties

This project is low risk. There is one easement break for a farm road culvert crossing (see Figure 9). Due to the rural nature of the project area, there is very little risk that changes in upstream land use in the project watershed would alter the hydrology or sediment supply to the extent that the project is threatened. Beaver may periodically be a problem and, if necessary, Wildlands will utilize the USDA to manage beaver throughout the monitoring period.

9.0 Performance Standards

The stream performance standards for the project will follow approved performance standards presented in the DMS Mitigation Plan Template (Version 2.3, June 2017), the Annual Monitoring Template (June 2017), and the Stream Mitigation Guidelines issued October 2016 by the USACE and NCIRT. Annual monitoring and routine site visits will be conducted by a qualified scientist to assess the condition of the finished project. Specific performance standard components are proposed for stream morphology, hydrology, and vegetation. Performance standards will be evaluated throughout the seven-year post-construction monitoring period.

9.1 Streams

9.1.1 Dimension

Riffle cross sections should be stable and should show little change in bankfull areas, maximum depth ratios, and width-to-depth ratios. Per NCIRT guidance, bank height ratios shall not exceed 1.2 and entrenchment ratios shall be at least 2.2 for restored C and E channels to be considered stable. All riffle cross sections should fall within the parameters defined for channels of the designed stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a vertically incising thalweg and/or eroding channel banks. Changes in channels that indicate a movement toward stability or enhanced habitat include decreases in width-to-depth ratios in meandering channels and/or increases in pool depths. Remedial action would not be taken if channel changes indicate a movement toward stability.

9.1.2 Pattern and Profile

Visual assessments and photo documentation should indicate that streams are remaining stable and not indicating trends toward vertical or lateral instability.

9.1.3 Substrate

Channel substrate materials will be sampled with the pebble count method. Project reaches should show maintenance of coarser materials in the riffles and smaller particles in the pools. A reachwide pebble count will be performed in each reach every monitoring year for classification purposes. During as-built baseline monitoring, a pebble count will be performed at each surveyed riffle to characterize the pavement.



9.1.4 Photo Documentation

Photographs should illustrate the vegetation and morphological stability of the Site on an annual basis. Cross section photos should demonstrate no excessive erosion or degradation of the banks. Longitudinal photos should indicate the absence of persistent mid-channel bars and vertical incision. Grade control structures should remain stable. Deposition of sediment on the bank side of vane arms is preferable. Maintenance of scour pools on the channel side of vane arms is expected.

9.1.5 Hydrology

The occurrence of bankfull events will be documented throughout the monitoring period. Four bankfull flow events must be documented on restored streams during the seven-year monitoring period. The four bankfull events must occur in separate years. Stream monitoring will continue until four bankfull events in separate years have been documented.

9.2 Vegetation

Vegetative performance will be in accordance with the Stream Mitigation Guidelines issued October 2016 by the USACE and NCIRT. The success criteria is an interim survival rate of 320 planted stems per acre at the end of monitoring year three (MY3), 260 stems per acre at the end of monitoring year five (MY5), and a final vegetation survival rate of 210 stems per acre at the end of monitoring year seven (MY7). Planted vegetation must average at least seven feet in height in each plot at the end of MY5 and 10 feet in height in each plot at the end of MY7. Vegetation monitoring will be conducted between July 1 and the end of the of the growing season with an emphasis on monitoring later in the growing season to capture any effects of climatic or other conditions that may adversely affect vegetation survival. Individual plot data will be provided and will include height, density, vigor, damage (if any), and survival. In fixed vegetation plots, planted woody stems will be marked annually as needed and given a coordinate, based off a known origin, so they can be found in succeeding monitoring years. Mortality will be determined from the difference between the previous years living planted stems and the current years living planted stems. The extent of invasive species coverage will be monitored and controlled as necessary throughout the required monitoring period.

9.3 Visual Assessments

Visual assessments should support the specific performance standards for each metric as described above.

9.4 Wetlands

Groundwater monitoring will be conducted for seven years after construction to evaluate the hydrologic state of the re-established hydric and non-hydric wetland zones and the rehabilitated wetland zones. Groundwater monitoring gages will be established randomly across the Site.

Based on the soil types within the Site and on associated USACE guidance, the proposed performance standard for wetland hydrology shall be free groundwater surface within 12 inches of the ground surface for 10% of the growing season for Chatham County under normal precipitation conditions. Most of the Site contains soils most like the Worsham Series, which has a hydrology performance standard of 10-12% of the growing season, according to the Wilmington District Stream and Wetland Compensatory Mitigation Update issued in October 2016 by the USACE and NCIRT.

The estimated growing season for Chatham County is approximately 244 days (March 18 through November 17). Soil temperature probes will be installed onsite to determine growing season dates for each individual monitoring year. Per USACE guidance, probes will be located at a depth of 12 inches. The growing season will be defined as that portion of the year where soil temperature remains above 40 degrees Fahrenheit. The growing season may not begin before March 1 of each year when calculating hydroperiods. If a wetland zone does not meet the performance standard for a given monitoring year,



rainfall patterns will be analyzed, and the hydrograph will be compared to that of the reference wetlands to assess whether atypical weather conditions occurred during the monitoring period.

Soil profile descriptions will be recorded at each boring where a gage is installed before and after construction. The profile descriptions will present a record of the soil horizons, color, texture, and redoximorphic features.

10.0 Monitoring Plan

The monitoring plan for this project has been developed to ensure the required performance standards are met and project goals and objectives are achieved. Annual monitoring data will be reported using the DMS Annual Monitoring Reporting Template (June 2017). The monitoring report shall provide project data chronology that will facilitate an understanding of project status and trends, ease population of DMS databases for analysis and research purposes, and assist in project closeout decision making.

Using the DMS As-Built Baseline Monitoring Report Template (June 2017), a baseline monitoring document and as-built record drawings of the project will be developed within 60 days of planting completion and monitoring installation on the restored site. Monitoring reports will be prepared in the fall of each monitoring year and submitted to DMS by November 30. Full monitoring reports will be submitted to DMS in monitoring years one, two, three, five, and seven. Abbreviated monitoring reports will be submitted in monitoring years four and six. Closeout will be seven years beyond completion of construction or until performance standards have been met.

Table 17, below, describes how the monitoring plan is set up in order to verify project goals and objectives have been achieved.



Table 17: Monitoring Plan

Goal	Objective	Performance Standard	Monitoring Metric
Improve stream channel stability.	Construct stream channels that will maintain stable patterns and profiles, considering the hydrologic and sediment inputs to the system, the landscape setting, and the watershed conditions.	Entrenchment ratios remaining above 2.2 and bank height ratios remaining below 1.2 shown in cross section surveys, coarser material in riffles and finer material in pools shown in reachwide pebble counts, and progression towards stability shown in visual inspections.	Cross section monitoring, reachwide pebble counts, and visual inspections.
Improve instream habitat.	Install habitat features such as constructed riffles, cover logs, and brush toe into restored streams. Add woody materials to channel beds. Construct pools of varying depths.	There is no required performance standard for this metric.	NA
Reconnect channels with floodplains and riparian wetlands.	Reconstruct stream channels with appropriate bankfull dimensions and connection to existing floodplains.	Four bankfull events in separate years within monitoring period.	Crest gauges and/or pressure transducers recording flow elevations.
Restore wetland hydrology, soils, and plant communities.	Restore and enhance riparian wetlands by raising streambeds and planting native wetland species.	Free groundwater surface within 12 inches of the ground surface for 10% of the growing season.	Groundwater gauges will be placed in wetland re-establishment areas and monitored annually.
Restore and enhance native floodplain vegetation.	Plant native tree species in riparian zones where currently insufficient.	Survival rate of 320 planted stems per acre at MY3, 260 planted stems per acre at MY5, and 210 planted stems per acre at MY7.	One hundred square meter vegetation plots will be placed on 2% of the planted area of the project and monitored annually.
Permanently protect the Site from harmful uses.	Establish a conservation easement on the Site.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.

10.1 Monitoring Components

Project monitoring components are listed in more detail in Table 18, below. Approximate locations of proposed vegetation plots, cross sections, and groundwater gage monitoring components are illustrated in Figure 10.

Table 18: Monitoring Components

Parameter	Monitoring Feature	Quantity by Reach				Frequency	Notes
		Sandy Branch Reach 1	Sandy Branch Reach 2	UT1	UT2		
Dimension	Riffle Cross Section	1	2	1		Years 1, 2, 3, 5, and 7	1
	Pool Cross Section			0			
Pattern	Visual Assessment	NA					2
Profile							
Substrate	Reach Wide Pebble Count	1			Years 1, 2, 3, 5, and 7	3	
Hydrology	Crest Gage and/or Transducer	1 CG		NA		Semi-Annually	4
Vegetation	CVS Level 2	10 Fixed; 3 Random			Years 1, 2, 3, 5, and 7	5	
Wetlands	Groundwater Well	12			Quarterly	-	
Visual Assessment	Site Reconnaissance	Yes			Semi-Annually	-	
Exotic and Nuisance Vegetation						6	
Project Boundary						7	
Reference Photograph	Photograph	18			Annually	-	

1. Cross sections will be permanently marked with rebar and rebar caps to establish location. Surveys will include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg.
2. Pattern and profile will be assessed visually during semi-annual site visits. Longitudinal profile will be collected during as-built baseline monitoring survey only, unless observations indicate lack of stability and profile survey is warranted in additional years.
3. Reach wide pebble counts will be conducted each year that a monitoring report is submitted. Riffle cross section pebble counts will be conducted during as-built baseline monitoring only, unless observations indicate otherwise.
4. Crest gages and/or transducers will be inspected quarterly or semi-annually, evidence of bankfull events will be documented with photographs when possible. Transducers will be set to record stage once every 3 hours. Transducers will be inspected and downloaded semi-annually.
5. Vegetation monitoring will follow CVS protocols.
6. Locations of exotic and nuisance vegetation will be mapped.
7. Locations of vegetation damage, boundary encroachments, etc. will be mapped.



11.0 Long-Term Management Plan

The Site will be transferred to the North Carolina Department of Environmental Quality (NCDEQ) Stewardship Program. This party shall serve as the conservation easement holder and long-term steward for the property and will conduct periodic inspection of the Site to ensure that restrictions required in the conservation easement are upheld. The NCDEQ Stewardship Program is developing an endowment system within the non-reverting, interest-bearing Conservation Lands Conservation Fund Account. The use of funds from the Endowment Account will be governed by North Carolina General Statute GS 113A-232(d)(3). Interest gained by the endowment fund may be used for the purposes of stewardship, monitoring, stewardship administration, and land transaction costs, if applicable.

The Site Protection Instrument can be found in Appendix 1.

12.0 Adaptive Management Plan

Upon completion of construction, Wildlands will implement the post-construction monitoring defined in Section 10. Project maintenance will be performed during the monitoring years to address minor issues as necessary (see Appendix 10). If during annual monitoring it is determined that the Sites ability to achieve Site Performance Standards are jeopardized, Wildlands will notify DMS of the need to develop a Plan of Corrective Action. Once the Plan of Corrective Action is prepared and finalized, Wildlands will:

- Notify the USACE as required by the Nationwide Permit 27 general conditions;
- Revise performance standards, maintenance requirements, and monitoring requirements as necessary and/or required by the USACE;
- Obtain other permits as necessary;
- Implement the Corrective Action Plan; and
- Provide the USACE a Record Drawing of Corrective Actions. This document shall depict the extent and nature of the work performed.

13.0 Determination of Credits

The final stream and wetland credits associated with the Site are listed in Table 19, below. Stream restoration and wetland re-establishment are proposed at a ratio of 1.0:1. Wetland rehabilitation is proposed at a ratio of 1.5:1. All stream buffers meet the minimum 50-foot requirement. The credit release schedule is in Appendix 11.



Table 19: Asset Table

Mitigation Credits								
		Stream		Riparian Wetland		Non-Riparian Wetland		
Type		R	RE	R	RE	R	RE	
Totals		3,286.000	-	4.721	2.546	NA	NA	
Project Components								
Project Component or Reach ID		Existing Footage/Acreage	Proposed Stationing Location	Approach (P1, P2, etc.)	Restoration (R) or Restoration Equivalent (RE)	Footage or Acreage	Mitigation Ratio (:1)	Proposed Credit
Sandy Branch	R1	838	100+00' - 108+61'	R, P1	R	861	1.0	861.000
	External Crossing	50	108+61' - 109+01'	NA	NA	40	NA	NA
	R1	126	109+01' - 110+11'	R, P1	R	110	1.0	110.000
	R2	1931	110+11' - 129+40'	R, P1	R	1,929	1.0	1,929.000
UT1		102	200+61' - 201+92'	R, P1	R	131	1.0	131.000
UT2		257	300+38' - 302+93'	R, P1	R	255	1.0	255.000
Wetland Re-Establishment		NA	NA	NA	R	4.721	1.0	4.721
Wetland Rehabilitation		3.819	NA	NA	RE	3.819	1.5	2.546
Component Summation								
Restoration Level				Stream Footage	Riparian Wetland Acreage	Non-Riparian Wetland Acreage		
Restoration				3,286	-	-		
Enhancement II				-	-	-		
Re-Establishment				-	4.721	NA		
Rehabilitation				-	3.819	NA		



14.0 References

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- Walker, Alan, unpublished. NC Rural Mountain and Piedmont Regional Curve.



Figures

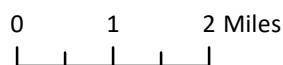
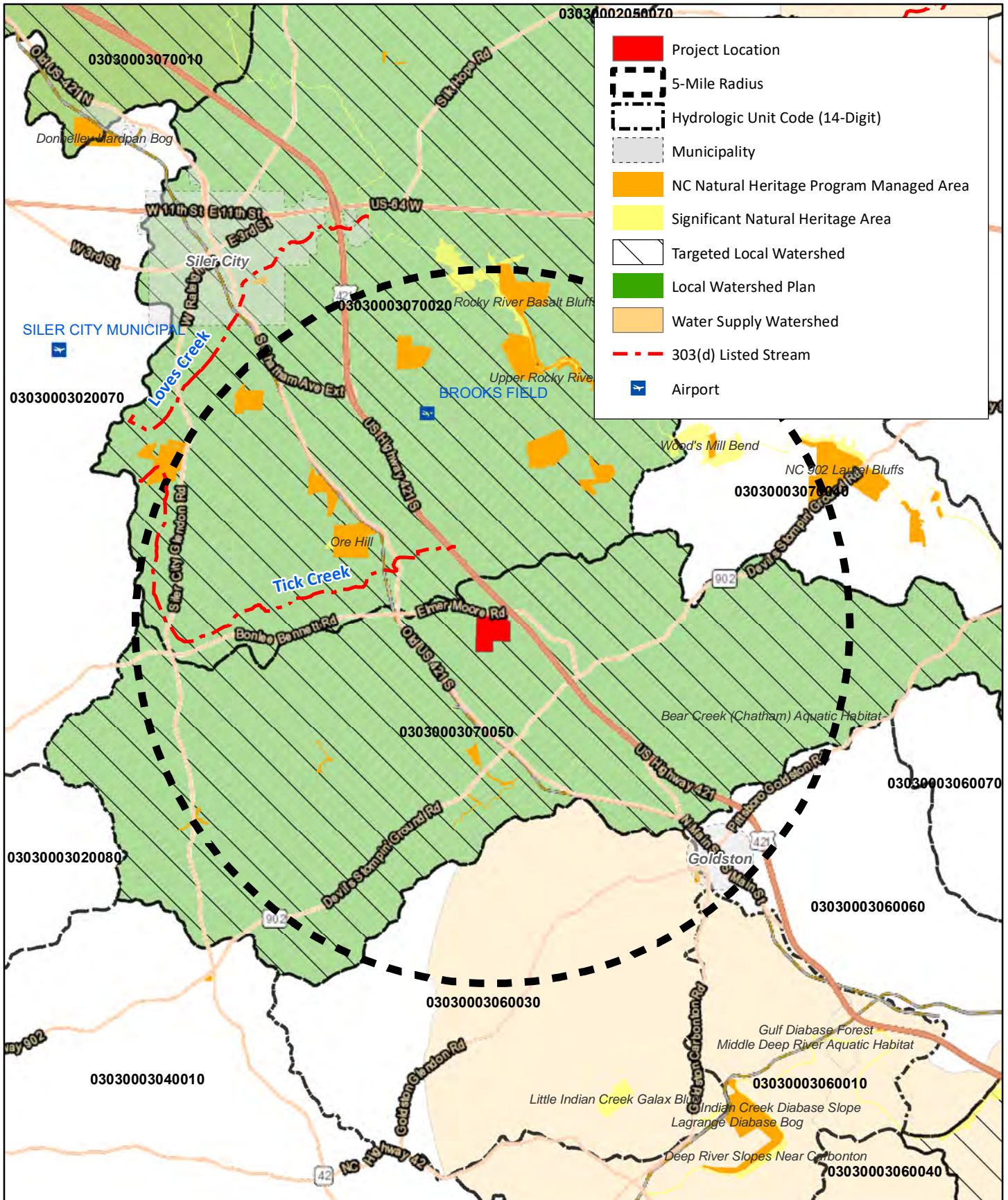


Figure 1 - Vicinity Map
Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)

Chatham County, NC

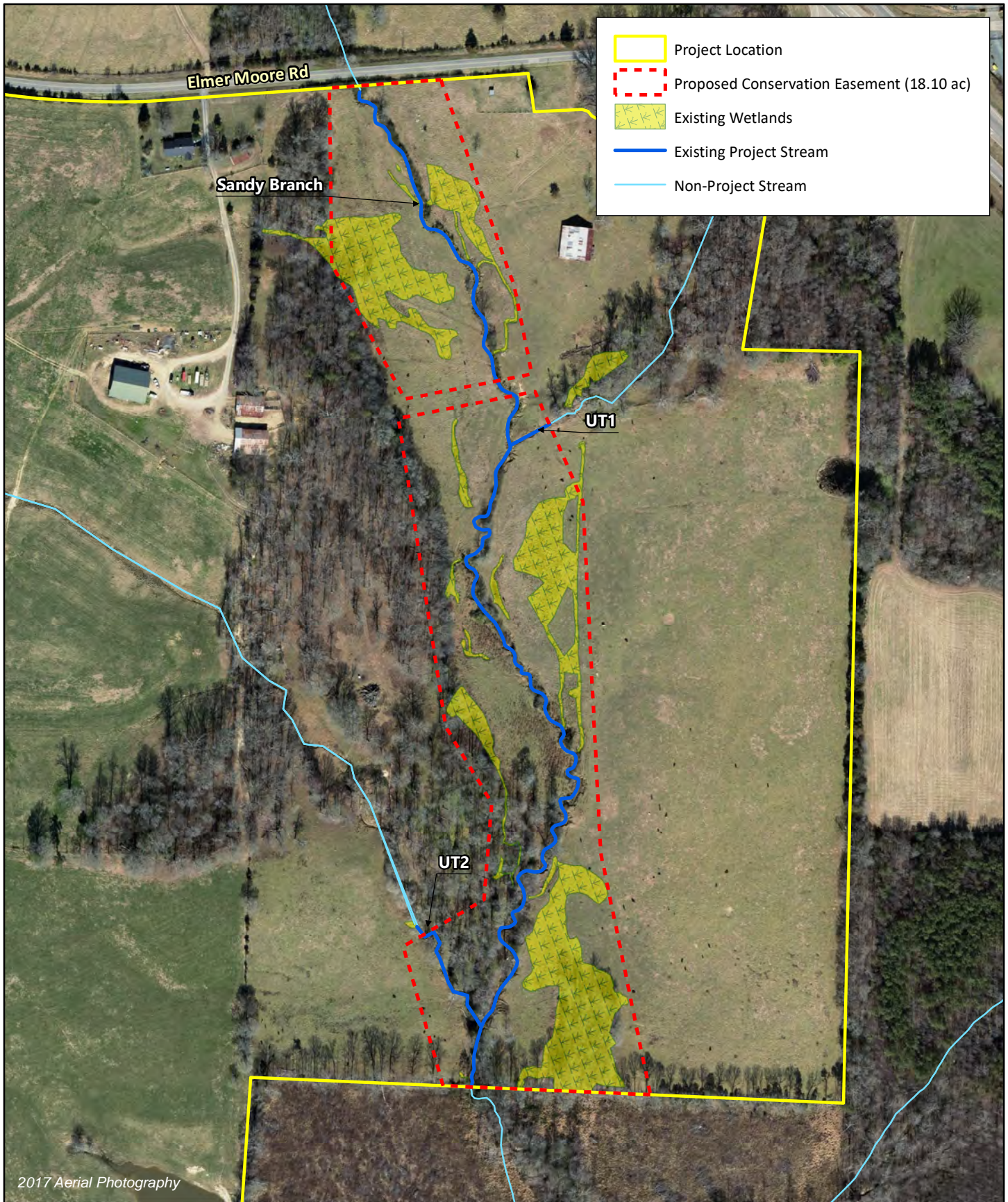


Figure 2 - Site Map
 Sandy Branch Mitigation Site
 Cape Fear River Basin (03030003)
 Chatham County, NC

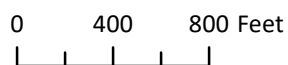
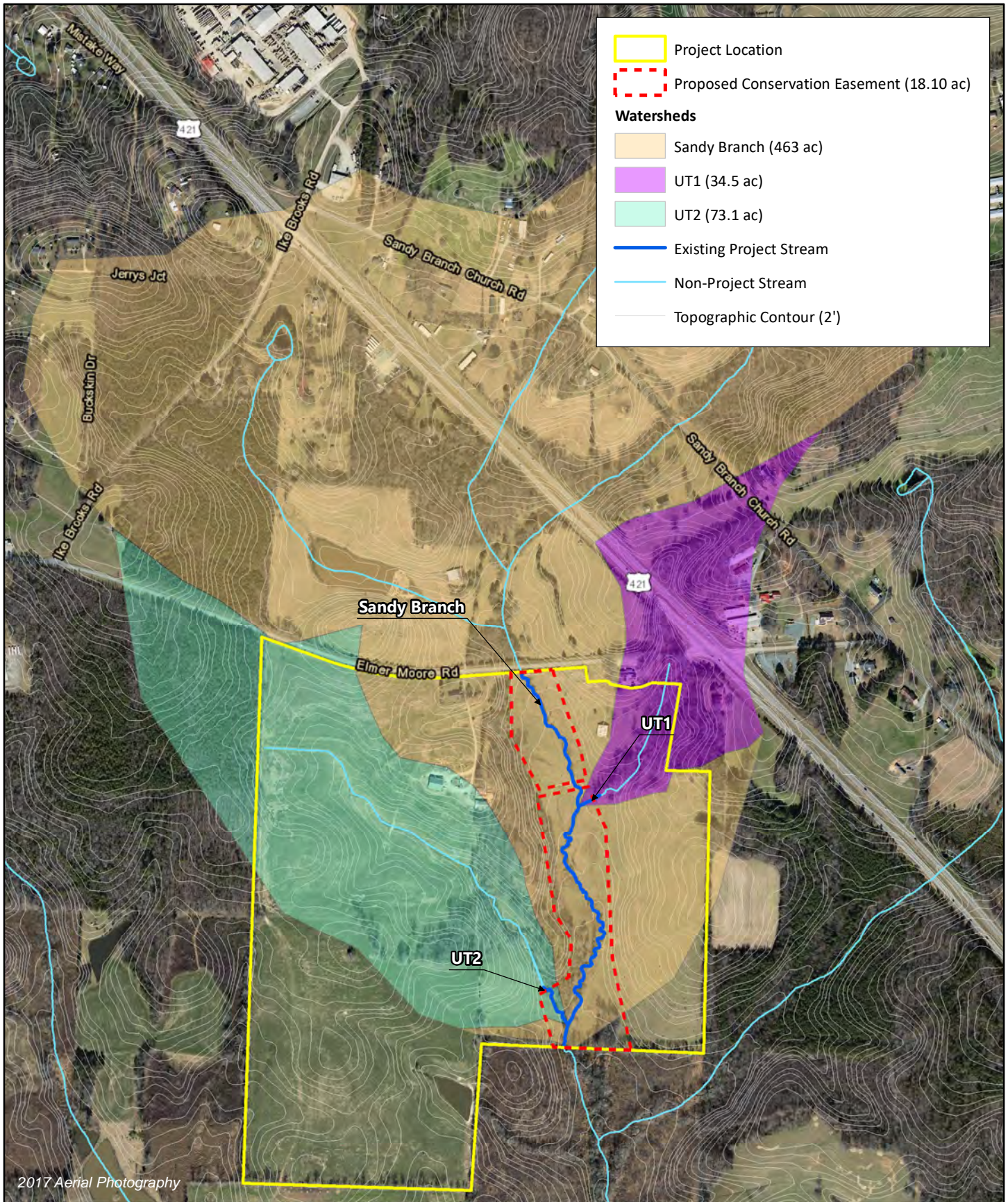


Figure 3 - Watershed Map
Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)

Chatham County, NC

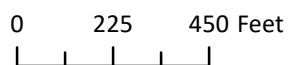
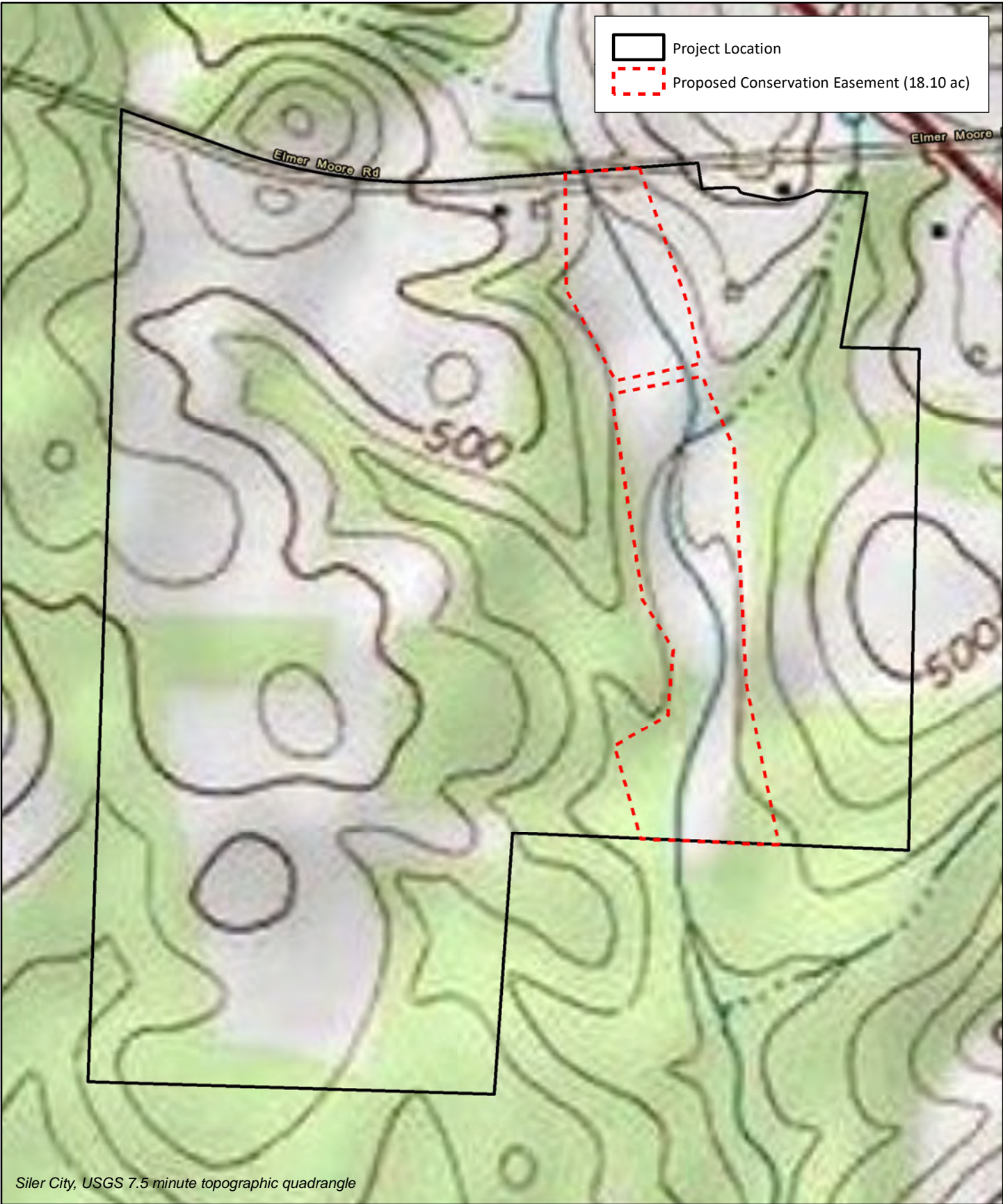


Figure 4 - USGS Topographic Map
Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)

Chatham County, NC

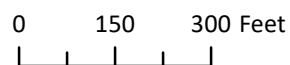
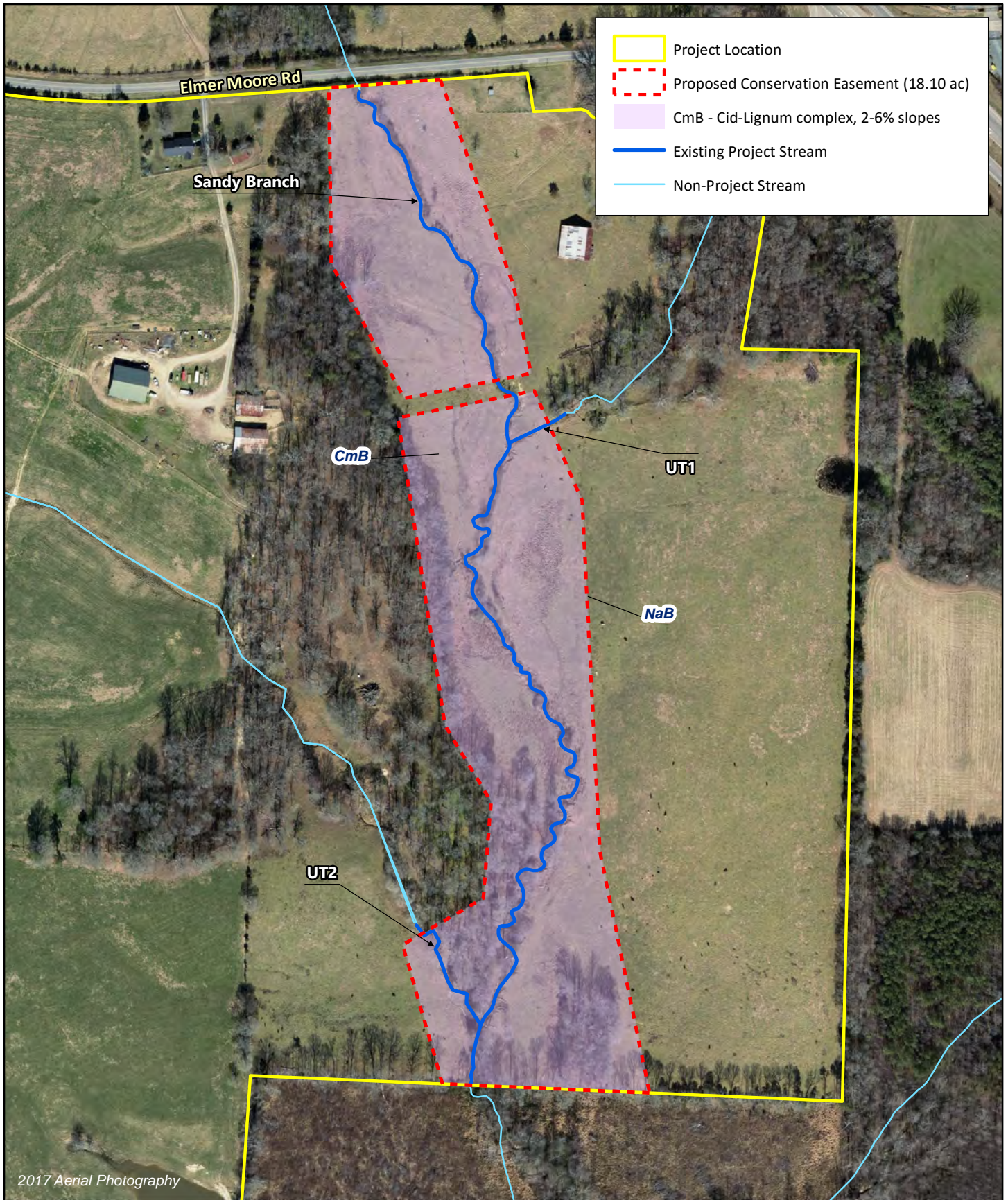
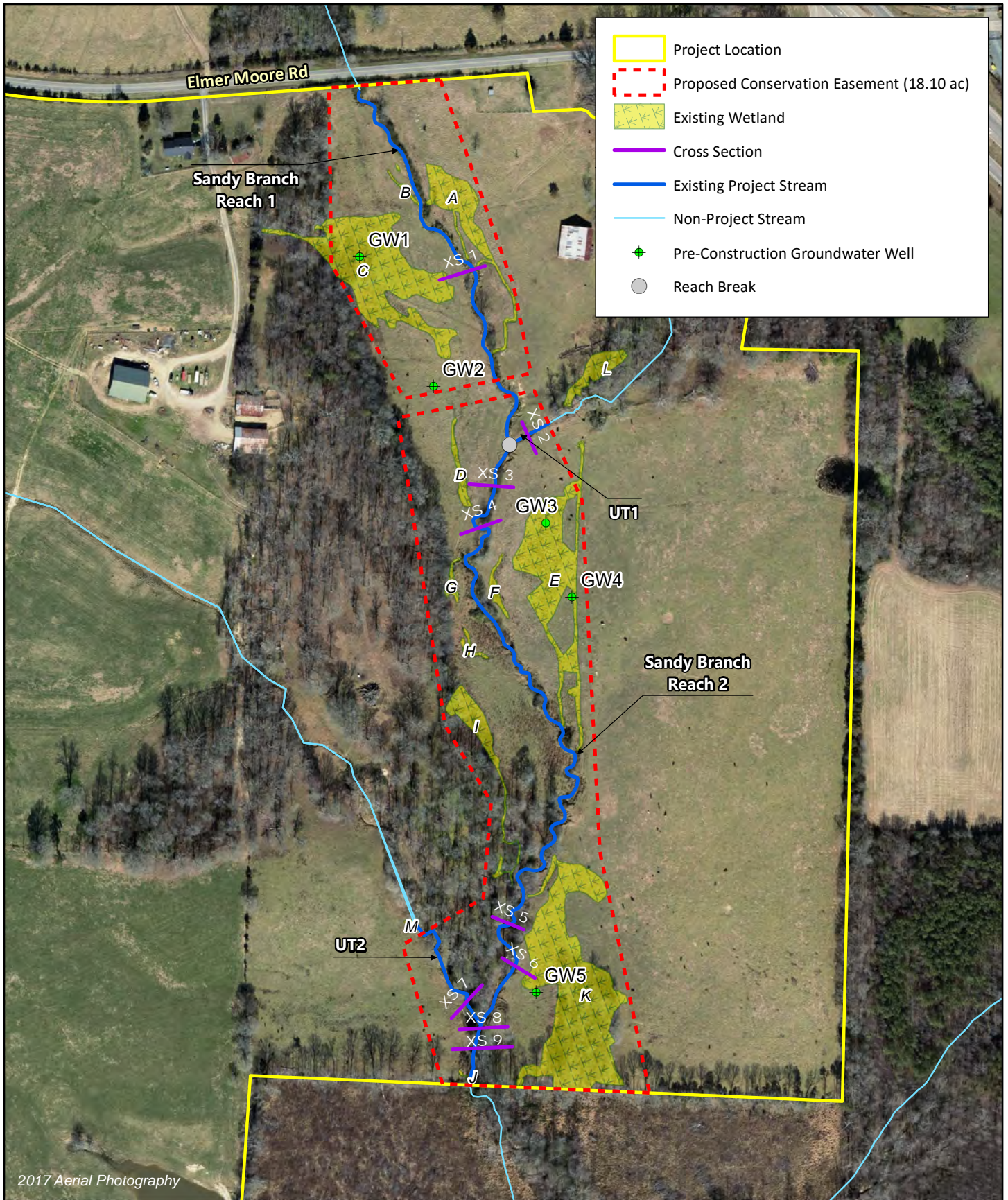


Figure 5 - Soils Map
 Sandy Branch Mitigation Site
 Cape Fear River Basin (03030003)
 Chatham County, NC



2017 Aerial Photography

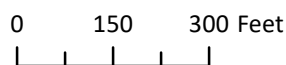
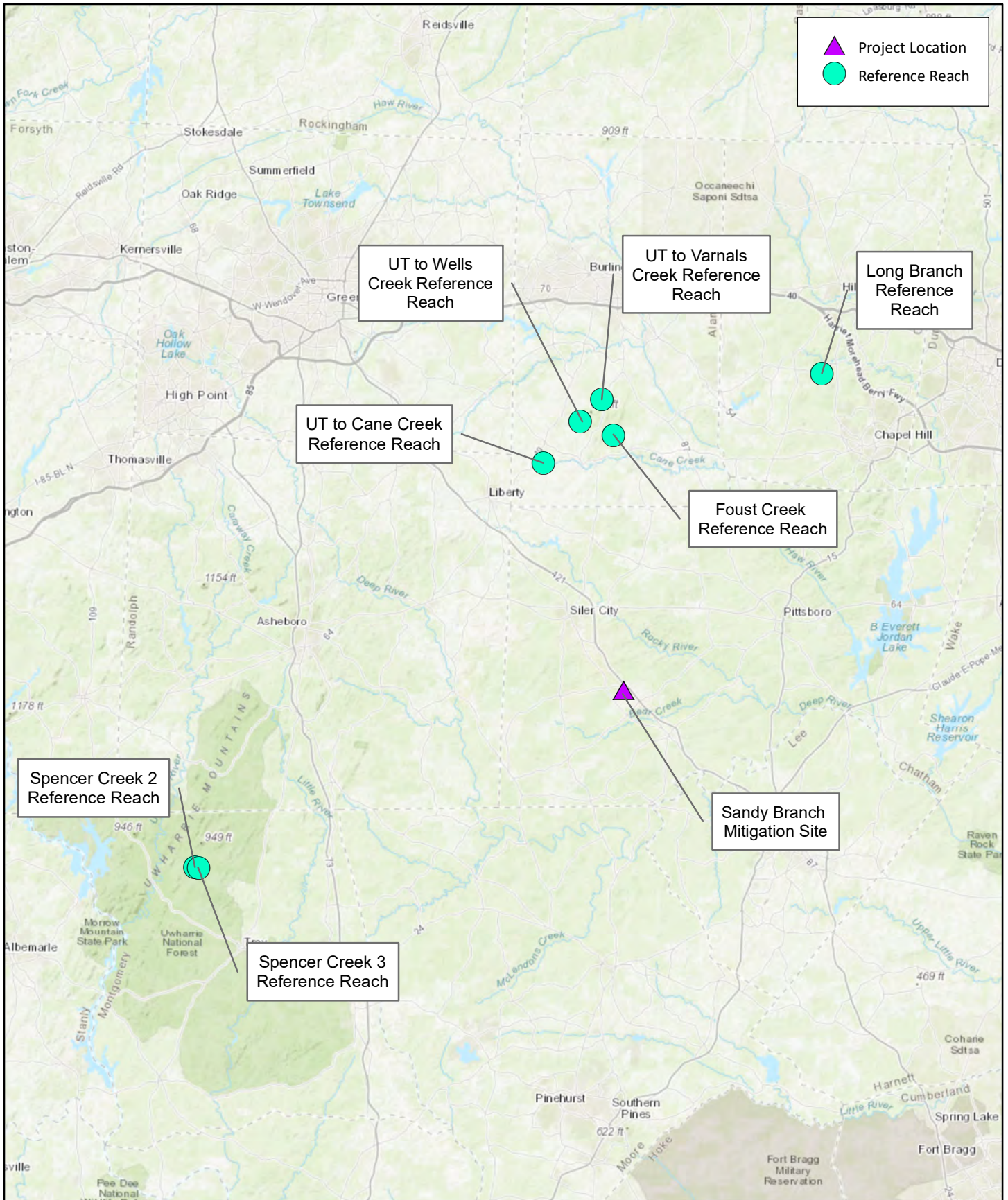


Figure 6 - Existing Conditions Map
Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)

Chatham County, NC



▲ Project Location
● Reference Reach

UT to Wells
Creek Reference
Reach

UT to Varnals
Creek Reference
Reach

Long Branch
Reference
Reach

UT to Cane Creek
Reference Reach

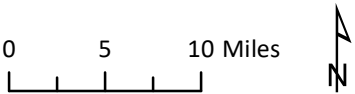
Foust Creek
Reference Reach

Spencer Creek 2
Reference Reach

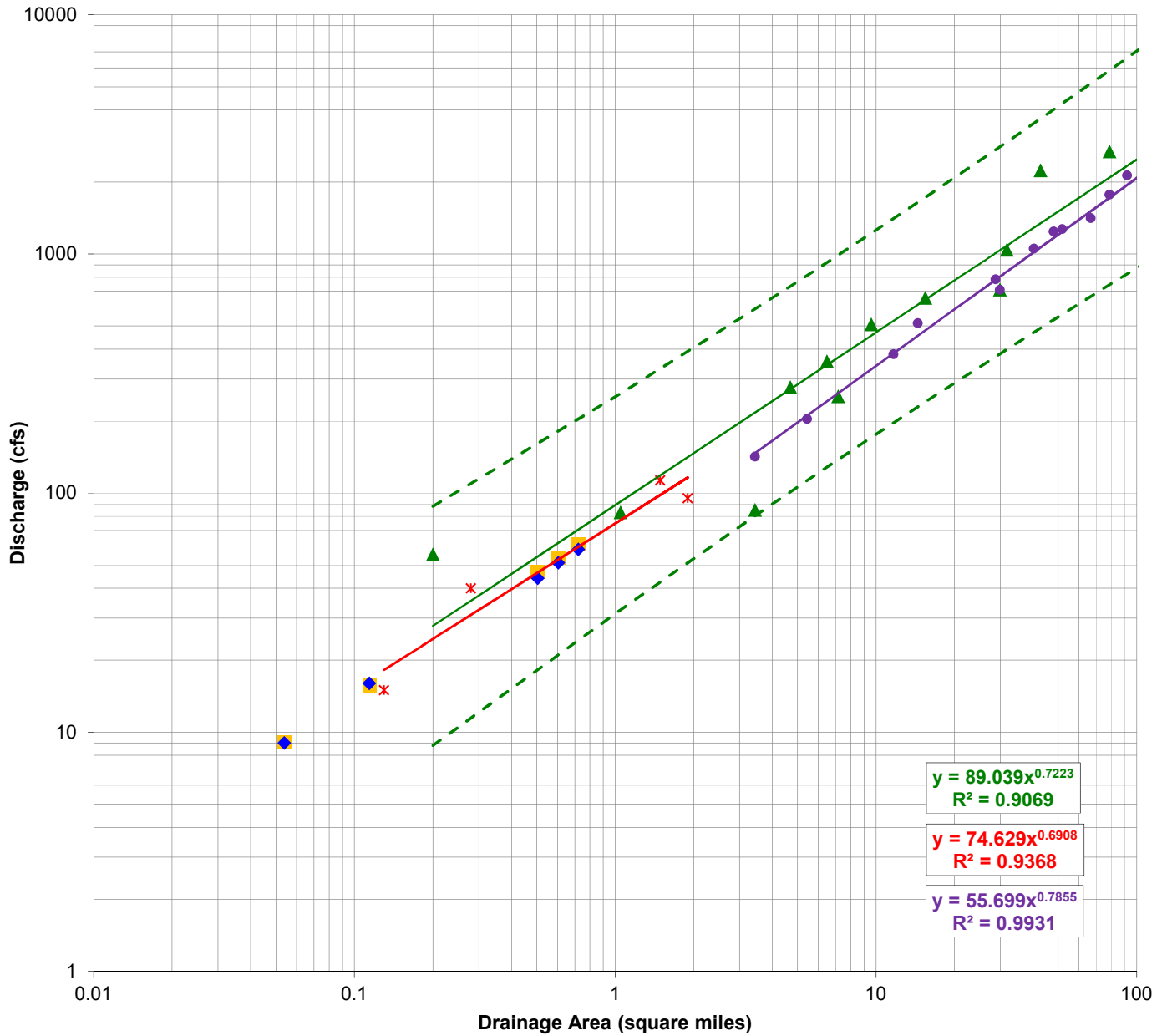
Sandy Branch
Mitigation Site

Spencer Creek 3
Reference Reach

Figure 7 - Reference Reach Vicinity Map
Sandy Branch Mitigation Site
Cape Fear River Basin (03030002)



Bankfull Discharge Plot



- ▲ NC Rural Piedmont Regional Curve
- Rural Upper 95% Limit
- * Site-Specific Reference Reach Curve
- NRCS Rural Piedmont and Mountains Regional Curve
- Power (NC Rural Piedmont Regional Curve)
- Power (Site-Specific Reference Reach Curve)
- Rural Lower 95% Limit
- Wildlands Regional USGS Flood Frequency Analysis 1.2-yr Predictions
- ◆ Design Discharges
- Power (NRCS Rural Piedmont and Mountains Regional Curve)



Figure 8 - Bankfull Discharge Plot
Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)

Chatham County, NC

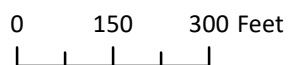
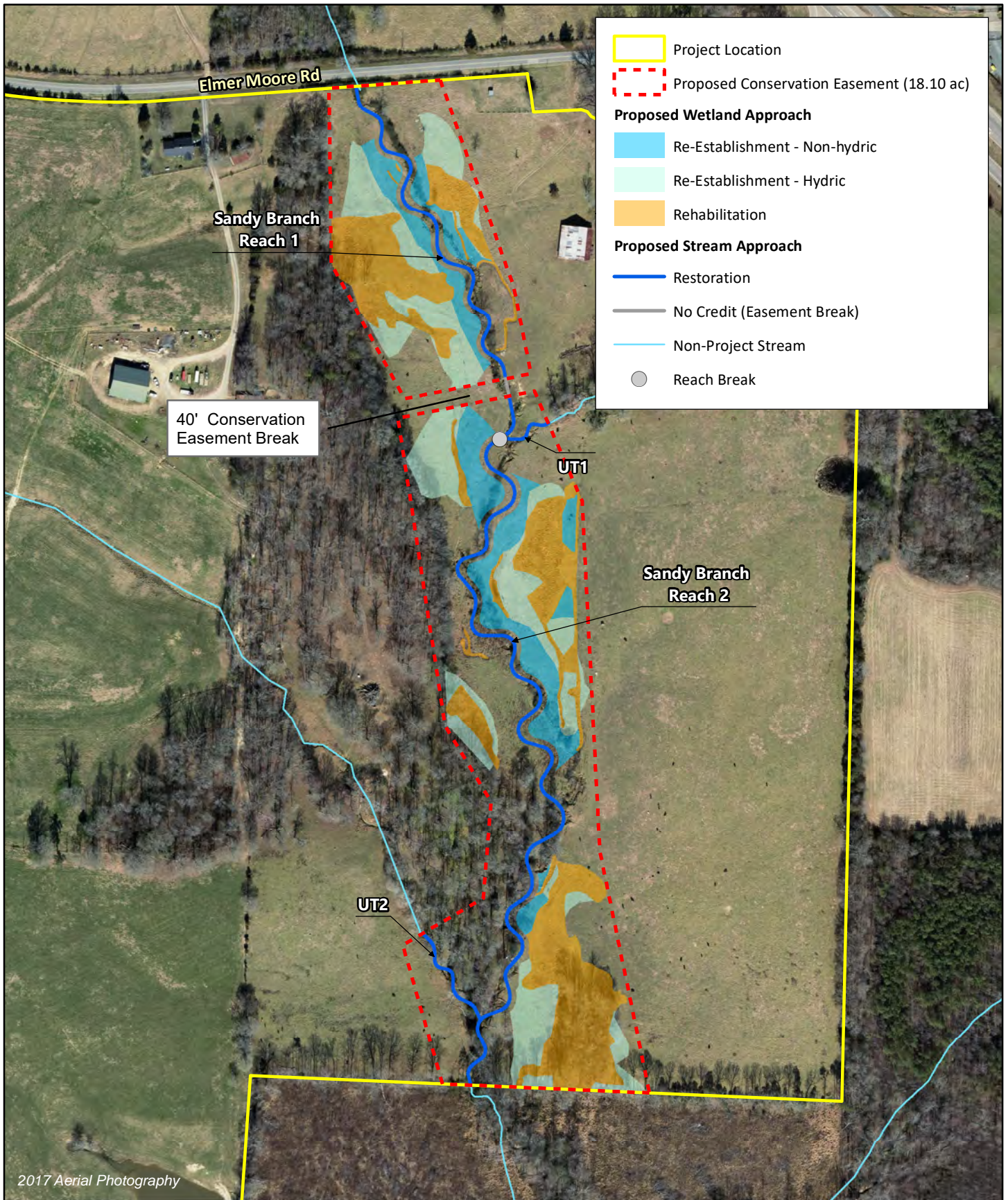
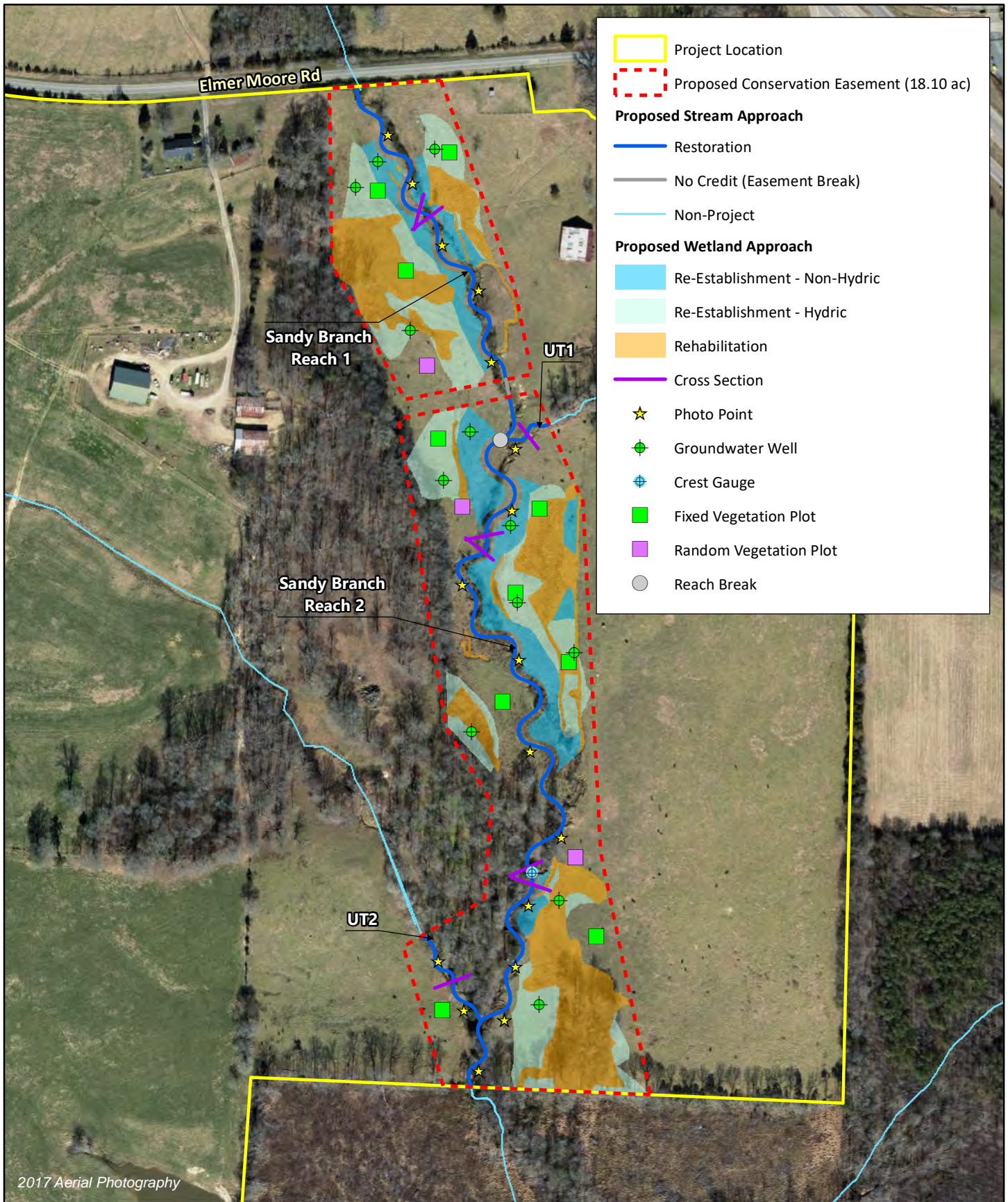


Figure 9 - Concept Design Map
Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)

Chatham County, NC



Appendix 1

Site Protection Instrument

Site Protection Instrument

The land required for construction, management, and stewardship of this mitigation project includes portions of the parcel listed in Table 1. This area totals 18.1 acres. The deed book and page number listed are for the agreements on an option to purchase a conservation easement. A conservation easement will be recorded on the parcel and includes streams being restored, wetlands being restored, and riparian buffers.

Table 1: Site Protection Instrument

Property Owner	Parcel ID Number	County	Site Protection Instrument	Memorandum of Option Deed Book (DB) and Page Number (PG)
Todd Stephan Moore and Lu Anne Moore	8507	Chatham	CE	DB:1882 PG: 316

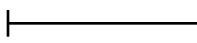
All site protection instruments require 60-day advance notification to the USACE and or DMS prior to any action to void, amend, or modify the document. No such action shall take place unless approved by the State.

Appendix 2
Historic Aerial Photos



INQUIRY #: 3822783.1

YEAR: 1965

 = 500'





INQUIRY #: 3822783.1

YEAR: 1983

| = 500'





INQUIRY #: 3822783.1

YEAR: 2005

| = 500'



Figure A

Legend


 491 ELMER MOORE



Figure B

Legend


 491 ELMER MOORE



Figure C

Legend
491 ELMER MOORE



491 ELMER MOORE

Sandy Branch

Pond Dam



Figure D

Legend

 491 ELMER MOORE

Farm road in woods

Sandy Bank

 491 ELMER MOORE

512

Farm road in woods



Appendix 3
Licensed Soil Scientist Report

HYDRIC SOIL & SITE INVESTIGATION

Sandy Branch Mitigation Site
Chatham County, North Carolina
Three Oaks Job # 19-710

Prepared For:

Wildlands Engineering, Inc.
312 W. Millbrook, Suite 225
Raleigh, NC 27609

Prepared By:

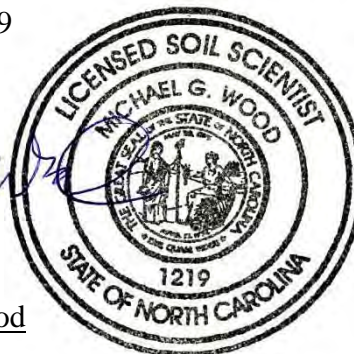


324 Blackwell Street, Suite 1200
Durham, NC 27701
(919) 732-1300

March 15, 2019



Michael G. Wood



INTRODUCTION & SITE DESCRIPTION

Wildlands Engineering, Inc. is considering mitigating a section of the Sandy Branch Mitigation Site in the Cape Fear River Basin (03030003). The site is accessed from Elmer Moore Road near the intersection with US 421 south of Siler City, Chatham County, NC. The Catena Group performed a site investigation in 2014, the details of which are provided in the March 6, 2014 Hydric Soil Investigation Moore Tract Mitigation Site. Three Oaks Engineering (Three Oaks) performed a site investigation in 2017, the details of which are provided in the December 14, 2017 Moore Tract Hydric Soil Report. Three Oaks has been retained to perform a more detailed soil and site assessment that describes and classifies the soil throughout the study area and makes a general determination as to its hydric status and potential to provide wetland mitigation. The site runs along a valley, is mostly open pasture, with a few wooded sections.

INVESTIGATION METHODOLOGY

Prior to performing the evaluation, NRCS soils maps, USGS topographic maps, and the previous hydric soil reports were reviewed. The field investigation was performed on February 13, 2019, by Michael G. Wood, LSS and John C. Roberts, LSS. Borings were advanced in the Assessment Area via a hand auger. Observations of the landscape and soil properties (depth, texture, seasonal wetness, restrictive horizons, etc.) were recorded. Hydric soil status was determined based upon the NRCS Field Indicators of Hydric Soils in the United States - A Guide for Identifying and Delineating Hydric Soils (Version 8.2, 2018). Soil wetland mitigation potential was determined based upon evidence of past and present hydric soil conditions.

RESULTS

There are many partial remnants of small, braided channels throughout the study area. Soil borings near these channels often are either hydric, or appear to have been hydric in the recent past (pre-colonial colonization). It appears the system has since been channelized to create a primary drainageway that would drain the site more quickly and efficiently, which has effectively altered the hydrology throughout the floodplain. Several borings exhibited 3 - 17 inches of fill, likely from the straightening and deepening of the channel and flattening of the floodplain. However, the soil does not appear to be overly altered through human manipulation as is typically seen in similar landscape positions.

The limits of hydric soil were identified and located via a submeter GPS. As shown on Figure 1, there is approximately 6.5 acres hydric soil that generally meets indicator F3 Depleted Matrix which states:

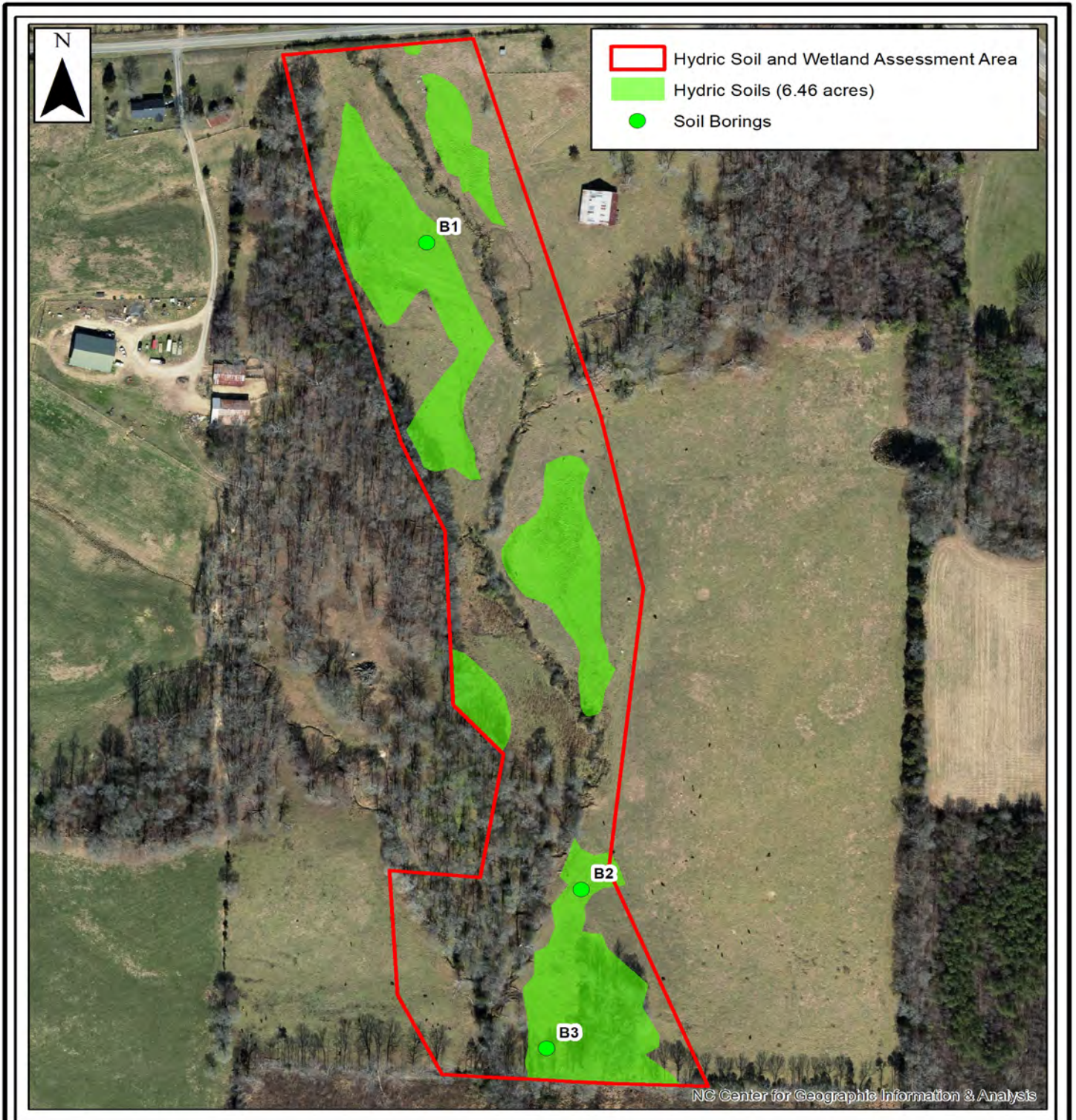
- F3. Depleted Matrix – A layer that has a depleted matrix with 60 percent or more chroma of 2 or less and the has a minimum thickness of either:
- a. 5 cm (2 inches) if the 5 cm starts at a depth of ≤ 10 cm (4 inches) from the soil surface, or
 - b. 15 cm (6 inches), starting at a depth of ≤ 25 cm (10 inches) from the soil surface.

Representative soil logs are appended. The soils are most closely associated with the Worsham soil series, a fine, mixed, active, thermic Typic Endoaquult.

CONCLUSION

The site reflects evidence of being altered through human manipulation primarily through stream channelization, though there is also evidence of some erosion from adjacent uplands and leveling of the floodplain. As such, it is anticipated that Priority 1 stream restoration will result in re-establishment of the 6.5 acres of historic wetlands.

The findings presented herein represent Three oaks' professional opinion based on our Hydric Soil Investigation and knowledge of the current regulations regarding wetland mitigation in North Carolina and national criteria for determining hydric soil.



Hydric Soil Investigation

Sandy Branch Mitigation Site

Chatham County, North Carolina

Date: March 2019

Scale: 0 80 160 Feet

Job No.: 19-710

Drawn By: ETM Checked By: MGW

Figure

1

SOIL EVALUATION FORM

Three Oaks Engineering
 324 Blackwell Street, Suite 1200
 Durham, NC 27701
 919.732.1300

Job:
 County: Chatham
 Date: 2-13-19
 Sheet: 1 of 1

Profile #	Horizon	Horizon Depth (in)	Structure / Texture	Consistence / Mineralogy	Matrix Color	Mottle Colors (Quantity, Size, Contrast, Color)
1	A	0-3	1 M GR / SIL	FR / SS, SP	10YR 4/2	m, 1 P 7.5YR 4/6, OR
	AB	3-11	1 M SBK / SIL	FR / SS, SP	10YR 4/2	c, 2, F 10YR 5/2; c, OR c, 2 D 7.5YR 4/6
	Bt ₁	11-14	1 M SBK / SIL	FR / S, SP	10YR 5/2	c, 2 D 10YR 5/6; m, 2, D 10YR 3/2
	Bt ₂	14-24	1 M SBK / C	FR / S, P	10YR 5/2	m, 2, P 10YR 4/8
2	A	3	2 M GR / SIL	FR / SS, SP	10YR 4/3	m, 2, D 2.5Y 5/2; MANY D.R.
	BA	9	1, M, SBK / SIL	FI / SS, SP	2.5Y 6/2	m, 2, D 7.5YR 5/6; MANY D.R.
	Bt ₁	21	1, M, SBK / SIL	FI / SS, SP	2.5Y 6/2	c, 2, F 2.5Y 6/1; m, 2, D 10YR 5/6
	BC	36	1, M, SBK / C	FI / SS, SP	10YR 6/1	m, 3, P 10YR 5/8
3	A ₁	3	1, M, GR / SIL	FR / SS, SP	2.5Y 5/3	MANY D.R.
	A _{b1}	7	1, M, GR / SIL	FR / SS, SP	2.5Y 5/2	c, 2, F 10YR 4/4; Mn conc
	E ₁	12	1, M, SBK / SL	FR / SS, SP	2.5Y 5/3	c, 2, F 10YR 4/4
	E ₂	18	1, M, SBK / SL	FR / SS, SP	2.5Y 6/4	m, 2, F 2.5Y 4/6
	Bt ₁	22	1, M, SBK / C	FI / S, P	10YR 6/6	c, 2, D 10YR 5/8; m, 2, D 2.5Y 6/9
	Bt ₂	28	1, M, SBK / C	FI / S, P	10YR 5/8	c, 2, D 10YR 6/3

Evaluated by: MGW, JCR

Appendix 4

Jurisdictional Determination and Wetland Assessment Forms

**U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT**

Action Id. SAW-2019-00362 County: Chatham County U.S.G.S. Quad: Siler City

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Applicant: Wildlands Engineering
Charlie Neaves
Address: 312 West Millbrook Road
Suite 225
Raleigh, North Carolina 27609

Telephone Number: 919-851-9986

Size (acres) 21 acres (approximately)
Nearest Waterway Sandy Branch
USGS HUC 03030003

Nearest Town Siler City
River Basin Cape Fear
Coordinates Latitude: 35.64300
Longitude: -79.38739

Location description: The site is located at 289 Elmer Moore Road near Bear Creek in Chatham County, North Carolina and is identified as the Sandy Branch Mitigation Site (Site Map is attached to the Preliminary Jurisdictional Determination (PJD) form associated with this action.

Indicate Which of the Following Apply:

A. Preliminary Determination

- There are waters, including wetlands, on the above described project area, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The waters, including wetlands, have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.
- There are wetlands on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the waters, including wetlands, have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the waters, including wetlands, at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

- There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are waters of the U.S., including wetlands, on the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

SAW-2019-00362

- We recommend you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.
- The waters of the U.S., including wetlands, on your project area have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.
- The waters of the U.S., including wetlands, have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on _____. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are no waters of the U.S., to include wetlands, present on the above described project area which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Morehead City, NC, at (252) 808-2808 to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Andrew Williams at (919) 554-4884 or xxxAndrew.E.Williams2@usace.army.mil.**

C. Basis For Determination: N/A. An Approved JD has not been completed.

D. Remarks: USACE conducted a site visit on March 15, 2019

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information for Approved Jurisdiction Determinations (as indicated in Section B. above)

If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **Not Applicable.** **It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.**

SAW-2019-00362

Andrew Williams Date: 2019.06.17
16:14:09 -04'00'

Corps Regulatory Official: _____

Date: **June 17, 2019**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Copy Furnished:

None

PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: June 17, 2019

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Charlie Neaves, 312 West Millbrook Road, Suite 225, Raleigh North Carolina, 27609.

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: SAW Raleigh Field Office, Sandy Branch Mitigation Site/Todd and LuAnne Moore/Bear Creek NC/Chatham County, SAW-2019-00362

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: The site is located southwest of the US 421, Elmer Moore Road intersection in Chatham County, North Carolina.

(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: North Carolina County/parish/borough: Chatham County City:

Center coordinates of site (lat/long in degree decimal format): Lat.: 35.6430086226277° Long.: -79.3873951869018°

Universal Transverse Mercator:

Name of nearest waterbody: Sandy Branch

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determination. Date: 17 June 2019

Field Determination. Date(s): 15 March 2019

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable)	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
UT to sandy Branch	35.64547800	-79.38797700	2942 linear feet	Non wetland waters	Section 404
UT1	35.64388000	-79.38709000	163 linear feet	Non wetland waters	Section 404
UT2	35.64044800	-79.38761200	195 linear feet	Non wetland waters	Section 404
UT2a	35.64043700	-79.38765400	19 linear feet	Non wetland waters	Section 404
Wetland A	35.64529600	-79.38765300	0.328 acres	wetland	Section 404
Wetland B	35.64551600	-79.38806800	0.018 acres	wetland	Section 404
Wetland C	35.64490600	-79.38837100	1.053 acres	wetland	Section 404

Wetland D	35.64379500	-79.38746900	0.058 acres	wetland	Section 404
Wetland E	35.64310700	-79.38701600	0.765 acres	wetland	Section 404
Wetland F	35.64291300	-79.38733500	0.037 acres	wetland	Section 404
Wetland G	35.64292900	-79.38769500	0.029 acres	wetland	Section 404
Wetland H	35.64249400	-79.38738600	0.023 acres	wetland	Section 404
Wetland I	35.64196000	-79.38744800	0.203 acres	wetland	Section 404
Wetland J	35.63991700	-79.38758200	0.003 acres	wetland	Section 404
Wetland K	35.64022500	-79.38666000	1.482 acres	wetland	Section 404
Wetland L	35.64429900	-79.38659200	0.129 acres	wetland	Section 404
Wetland M	35.64085500	-79.38796100	0.007 acres	wetland	Section 404

- 1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

- 2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre- construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there "*may be*" waters of the U.S. and/or that there "*may be*" navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: May 3, 2019 Delineation Report from Wildlands Engineering
- Data sheets prepared/submitted by or on behalf of the PJD requestor.
 - Office concurs with data sheets/delineation report.
 - Office does not concur with data sheets/delineation report. Rationale: _____
- Data sheets prepared by the Corps: _____
- Corps navigable waters' study: _____
- U.S. Geological Survey Hydrologic Atlas: _____
 - USGS NHD data.
 - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: 1:24000; Siler City Quadrangle
- Natural Resources Conservation Service Soil Survey. Citation: Web Soil Survey
- National wetlands inventory map(s). Cite name: _____
- State/local wetland inventory map(s): _____
- FEMA/FIRM maps: _____
- 100-year Floodplain Elevation is: _____ (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date): Figure 3; Undated
or Other (Name & Date): Site photos; undated
- Previous determination(s). File no. and date of response letter: _____
- Other information (please specify): 15 February 2019, USACE site visit

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

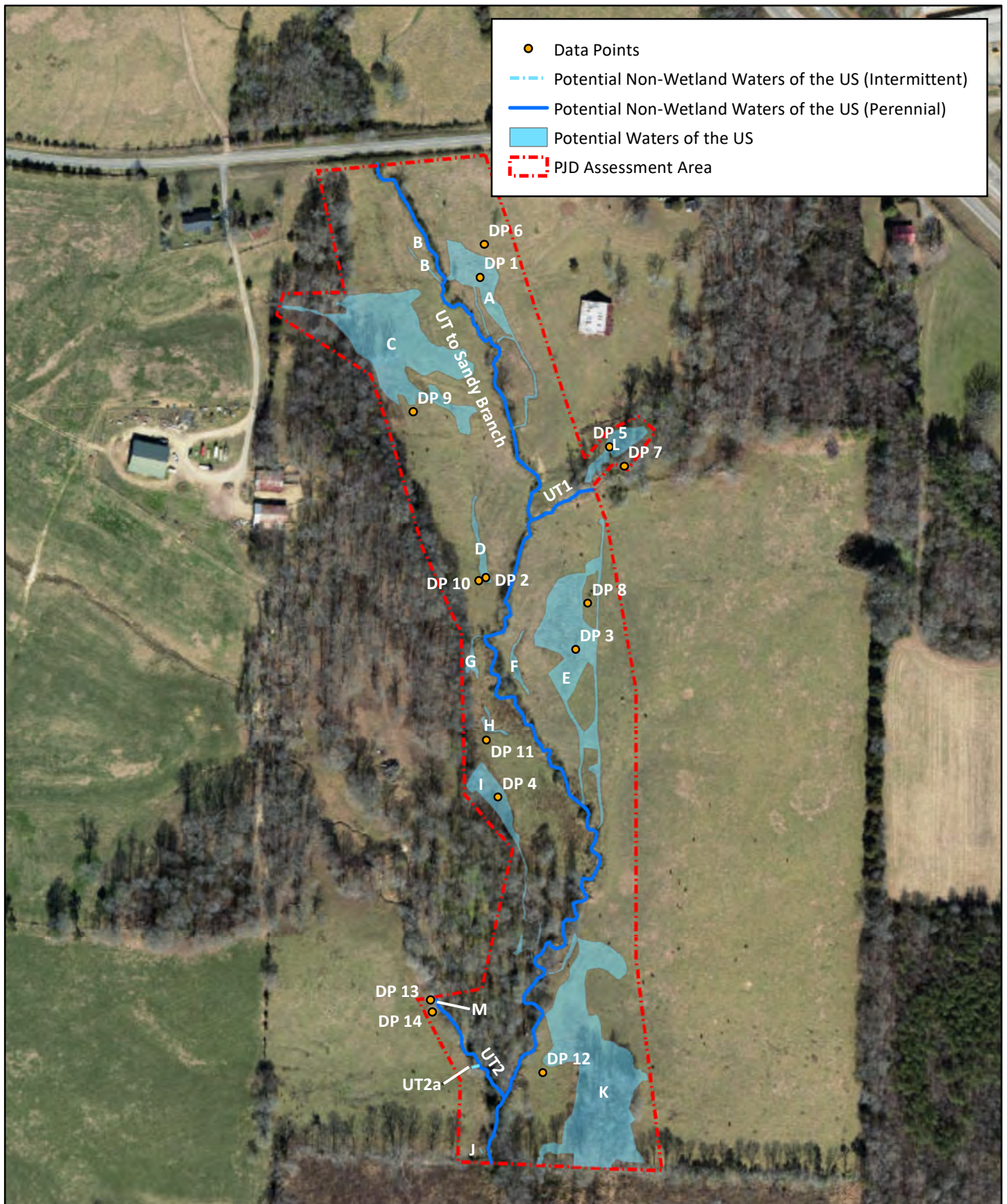
Andrew Williams Date: 2019.06.17
15:59:18 -04'00'

Signature and date of Regulatory staff member completing PJD

Charlie Neaves

Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)¹

¹ Districts may establish timeframes for requester to return signed PJD forms. If the requester does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.



0 300 Feet



Figure 3 - Site Map
Sandy Branch Mitigation Site
Cape Fear River Basin 03030003

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 1/15/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP1-Wetland A-C
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.645315 Long: -79.387608 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators</u> (minimum of one is required; check all that apply)	<u>Secondary Indicators</u> (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) <input checked="" type="checkbox"/> Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	_____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) <input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP1-Wetland A-C

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Juncus effusus</u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>
2. <u>Carex spp.</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Schedonorus arundinaceus</u>	<u>10</u>	<u>No</u>	<u>FACU</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>90</u> = Total Cover		
50% of total cover: <u>45</u>	20% of total cover: <u>18</u>		

Woody Vine Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>20</u>	x 2 = <u>40</u>
FAC species <u>60</u>	x 3 = <u>180</u>
FACU species <u>10</u>	x 4 = <u>40</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>90</u> (A)	<u>260</u> (B)
Prevalence Index = B/A = <u>2.89</u>	

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)
Vegetation impacted by pasutre managment and livestock grazing. Cannot ID Carex to species level due to lack of flowering parts.

SOIL

Sampling Point: DP1-Wetland A-C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 4/1	95	7.5YR 5/6	5	C	PL	Loamy/Clayey	Prominent redox concentrations
4-12	10YR 5/1	80	7.5YR 5/6	20	C	PL	Loamy/Clayey	Prominent redox concentrations

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (MLRA 136)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (F21)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> (outside MLRA 127, 147, 148)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Very Shallow Dark Surface (F22)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 122, 136)		
<input type="checkbox"/> Sandy Redox (S5)	<input checked="" type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147, 148)		
<input type="checkbox"/> Dark Surface (S7)			

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
---	---

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 1/15/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP 2-Wetland D
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.643460 Long: -79.387552 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators</u> (minimum of one is required; check all that apply)	<u>Secondary Indicators</u> (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) <input checked="" type="checkbox"/> Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	_____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) <input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)

Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP 2-Wetland D

<u>Tree Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
_____ = Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>50</u></td> <td>x 3 = <u>150</u></td> </tr> <tr> <td>FACU species <u>0</u></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>50</u> (A)</td> <td><u>150</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>3.00</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>50</u>	x 3 = <u>150</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>50</u> (A)	<u>150</u> (B)	Prevalence Index = B/A = <u>3.00</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>50</u>	x 3 = <u>150</u>																			
FACU species <u>0</u>	x 4 = <u>0</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>50</u> (A)	<u>150</u> (B)																			
Prevalence Index = B/A = <u>3.00</u>																				
50% of total cover: _____ 20% of total cover: _____																				
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. <u>Eleocharis spp.</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators: <u>1</u> - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> <u>2</u> - Dominance Test is >50% <input checked="" type="checkbox"/> <u>3</u> - Prevalence Index is ≤3.0 ¹ <u>4</u> - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
2. <u>Polygonum spp.</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
_____ = Total Cover																				
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>																				
<u>Herb Stratum</u> (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody Vine – All woody vines greater than 3.28 ft in height.																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
10. _____	_____	_____	_____																	
11. _____	_____	_____	_____																	
_____ = Total Cover																				
50% of total cover: _____ 20% of total cover: _____																				
<u>Woody Vine Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
_____ = Total Cover																				
50% of total cover: _____ 20% of total cover: _____																				

Remarks: (Include photo numbers here or on a separate sheet.)
 Vegetation impacted by pasture management and livestock grazing. Cannot ID Polygonum or Eleocharis to species level due to lack of flowering parts.

SOIL

Sampling Point: DP 2-Wetland D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 5/1	85	7.5YR 5/6	15	C	PL	Loamy/Clayey	Prominent redox concentrations

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 1/15/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP 3-Wetland E-H
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.643016 Long: -79.386873 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators</u> (minimum of one is required; check all that apply)	<u>Secondary Indicators</u> (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) <input checked="" type="checkbox"/> Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	_____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) <input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP 3-Wetland E-H

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Juncus effusus</u>	<u>50</u>	<u>Yes</u>	<u>FACW</u>
2. <u>Carex spp.</u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>
3. <u>Eleocharis spp.</u>	<u>8</u>	<u>No</u>	<u>FAC</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
<u>73</u> = Total Cover			
50% of total cover: <u>37</u>		20% of total cover: <u>15</u>	

Woody Vine Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>50</u>	x 2 = <u>100</u>
FAC species <u>23</u>	x 3 = <u>69</u>
FACU species <u>0</u>	x 4 = <u>0</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>73</u> (A)	<u>169</u> (B)
Prevalence Index = B/A = <u>2.32</u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)
Vegetation influence by pasture management and livestock grazing. Cannot ID Carex and Eleocharis to species level due to lack of flowering parts.

SOIL

Sampling Point: DP 3-Wetland E-H

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 4/2	98	10YR 6/8	2	C	PL	Loamy/Clayey	Prominent redox concentrations
4-12	10YR 5/1	90	7.5YR 6/8	10	C	PL	Loamy/Clayey	Prominent redox concentrations

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 1/29/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP 4 Wetland L-K
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.642102 Long: -79.387455 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u> Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: Above Normal Rainfall. Lack of hydrophytic vegetation believed to be result of livestock grazing and pasture management.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators</u> (minimum of one is required; check all that apply)	<u>Secondary Indicators</u> (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) _____ Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	_____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) <input checked="" type="checkbox"/> Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)

Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP 4 Wetland I-K

<u>Tree Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.0%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
=Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>50</u></td> <td>x 4 = <u>200</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>50</u> (A)</td> <td><u>200</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>4.00</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>50</u>	x 4 = <u>200</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>50</u> (A)	<u>200</u> (B)	Prevalence Index = B/A = <u>4.00</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>0</u>	x 3 = <u>0</u>																			
FACU species <u>50</u>	x 4 = <u>200</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>50</u> (A)	<u>200</u> (B)																			
Prevalence Index = B/A = <u>4.00</u>																				
50% of total cover: _____ 20% of total cover: _____																				
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15</u>)																				
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
=Total Cover				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)																
50% of total cover: _____ 20% of total cover: _____																				
<u>Herb Stratum</u> (Plot size: <u>5</u>)																				
1. <u>Schedonorus arundinaceus</u>	<u>50</u>	<u>Yes</u>	<u>FACU</u>																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
10. _____	_____	_____	_____																	
11. _____	_____	_____	_____																	
=Total Cover				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody Vine – All woody vines greater than 3.28 ft in height.																
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>																				
<u>Woody Vine Stratum</u> (Plot size: <u>30</u>)																				
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
=Total Cover																				
50% of total cover: _____ 20% of total cover: _____																				

Remarks: (Include photo numbers here or on a separate sheet.)
 Vegetation affected by pasture management and livestock grazing.

Hydrophytic Vegetation Present? Yes _____ No X

SOIL

Sampling Point: DP 4 Wetland I-K

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 5/2	85	10YR 6/8	15	C	M	Loamy/Clayey	Prominent redox concentrations
4-12	2.5Y 6/3	90	10YR 6/8	10	C	PL/M	Loamy/Clayey	Prominent redox concentrations

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/15/19

Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP 5 Wetland L

Investigator(s): C. Neaves Section, Township, Range: _____

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope (%): <1%

Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.644272 Long: -79.386621 Datum: _____

Soil Map Unit Name: Cid-Lignum complex NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)

Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present?	Yes <u>X</u> No _____	
Wetland Hydrology Present?	Yes <u>X</u> No _____	

Remarks:
Above Normal Rainfall.

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators</u> (minimum of one is required; check all that apply)	<u>Secondary Indicators</u> (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) _____ Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	_____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP 5 Wetland L

	Absolute % Cover	Dominant Species?	Indicator Status																	
Tree Stratum (Plot size: <u>30</u>)																				
1. <u>Ulmus americana</u>	<u>20</u>	Yes	FACW	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.0%</u> (A/B) Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; text-align: right;">Total % Cover of:</td> <td style="width:50%; text-align: left;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>20</u></td> <td>x 2 = <u>40</u></td> </tr> <tr> <td>FAC species <u>16</u></td> <td>x 3 = <u>48</u></td> </tr> <tr> <td>FACU species <u>0</u></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>36</u> (A)</td> <td><u>88</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>2.44</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>20</u>	x 2 = <u>40</u>	FAC species <u>16</u>	x 3 = <u>48</u>	FACU species <u>0</u>	x 4 = <u>0</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>36</u> (A)	<u>88</u> (B)	Prevalence Index = B/A = <u>2.44</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>20</u>	x 2 = <u>40</u>																			
FAC species <u>16</u>	x 3 = <u>48</u>																			
FACU species <u>0</u>	x 4 = <u>0</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>36</u> (A)	<u>88</u> (B)																			
Prevalence Index = B/A = <u>2.44</u>																				
2. <u>Quercus phellos</u>	<u>10</u>	Yes	FAC																	
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
_____ = Total Cover	<u>30</u>																			
50% of total cover: <u>15</u>		20% of total cover: <u>6</u>																		
Sapling/Shrub Stratum (Plot size: <u>15</u>)																				
1. _____				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
8. _____																				
9. _____																				
_____ = Total Cover																				
50% of total cover: _____		20% of total cover: _____																		
Herb Stratum (Plot size: <u>5</u>)																				
1. <u>Ranunculus bulbosus</u>	<u>6</u>	Yes	FAC	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody Vine – All woody vines greater than 3.28 ft in height. Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																
2. _____																				
3. _____																				
4. _____																				
5. _____																				
6. _____																				
7. _____																				
8. _____																				
9. _____																				
10. _____																				
11. _____																				
_____ = Total Cover	<u>6</u>																			
50% of total cover: <u>3</u>		20% of total cover: <u>2</u>																		
Woody Vine Stratum (Plot size: <u>30</u>)																				
1. _____																				
2. _____																				
3. _____																				
4. _____																				
5. _____																				
_____ = Total Cover																				
50% of total cover: _____		20% of total cover: _____																		

Remarks: (Include photo numbers here or on a separate sheet.)
Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP 5 Wetland L

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 4/1	85	7.5YR 6/8	15	C	M	Loamy/Clayey	Prominent redox concentrations
6-12	10YR 6/1	60	7.5YR 6/8	40	C	PL/M	Loamy/Clayey	Prominent redox concentrations

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Mucky Mineral (F1) (**MLRA 136**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 122, 136**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147, 148**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Red Parent Material (F21) (**outside MLRA 127, 147, 148**)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	Requirement Control Symbol EXEMPT (Authority: AR 335-15, paragraph 5-2a)
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/15/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP6-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.645517 Long: -79.387577 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
 Soil was saturated from surface to a depth of 1 inch. This observation is attributed to toe slope discharge during a period of above normal rainfall and is not associated with a water table immediately below the saturated zone, nor perching above a restrictive soil layer. Therefore the saturation observed does not satisfy hydrology indicator A3.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP6-Upland

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Schedonorus arundinaceus</u>	<u>60</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Trifolium repens</u>	<u>5</u>	<u>No</u>	<u>FACU</u>
3. <u>Ranunculus bulbosus</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>90</u> = Total Cover		
50% of total cover: <u>45</u>	20% of total cover: <u>18</u>		

Woody Vine Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>25</u>	x 3 = <u>75</u>
FACU species <u>65</u>	x 4 = <u>260</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>90</u> (A)	<u>335</u> (B)
Prevalence Index = B/A = <u>3.72</u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

 2 - Dominance Test is >50%

 3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet.)
 Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP6-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	2.5Y 4/2	90	10YR 6/8	10	C	M	Loamy/Clayey	
3-10	2.5Y 5/2	90	10YR 6/8	10	C	M	Loamy/Clayey	
10-12	2.5Y 6/1	100					Loamy/Clayey	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/15/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP7-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.644151 Long: -79.386512 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u> Hydric Soil Present? Yes _____ No <u>X</u> Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP7-Upland

<u>Tree Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.0%</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
=Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>0</u> x 3 = <u>0</u> FACU species <u>70</u> x 4 = <u>280</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>70</u> (A) <u>280</u> (B) Prevalence Index = B/A = <u>4.00</u>
50% of total cover: _____		20% of total cover: _____		
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15</u>)				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
=Total Cover				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
50% of total cover: _____		20% of total cover: _____		
<u>Herb Stratum</u> (Plot size: <u>5</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody Vine – All woody vines greater than 3.28 ft in height.
1. <u>Schedonorus arundinaceus</u>	<u>50</u>	<u>Yes</u>	<u>FACU</u>	
2. <u>Trifolium repens</u>	<u>10</u>	<u>No</u>	<u>FACU</u>	
3. <u>Cynodon dactylon</u>	<u>10</u>	<u>No</u>	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
=Total Cover				Hydrophytic Vegetation Present? Yes _____ No <u>X</u>
50% of total cover: <u>35</u>		20% of total cover: <u>14</u>		
<u>Woody Vine Stratum</u> (Plot size: <u>30</u>)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
=Total Cover				
50% of total cover: _____		20% of total cover: _____		

Remarks: (Include photo numbers here or on a separate sheet.)
 Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP7-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 3/2	100					Loamy/Clayey	
4-12	10YR 6/6	100					Loamy/Clayey	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/27/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP 8-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.643303 Long: -79.386782 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u> Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP 8-Upland

<u>Tree Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33.3%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
=Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>20</u></td> <td>x 3 = <u>60</u></td> </tr> <tr> <td>FACU species <u>50</u></td> <td>x 4 = <u>200</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>70</u> (A)</td> <td><u>260</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>3.71</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>20</u>	x 3 = <u>60</u>	FACU species <u>50</u>	x 4 = <u>200</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>70</u> (A)	<u>260</u> (B)	Prevalence Index = B/A = <u>3.71</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>20</u>	x 3 = <u>60</u>																			
FACU species <u>50</u>	x 4 = <u>200</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>70</u> (A)	<u>260</u> (B)																			
Prevalence Index = B/A = <u>3.71</u>																				
50% of total cover: _____		20% of total cover: _____																		
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)																
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
=Total Cover																				
50% of total cover: _____		20% of total cover: _____																		
<u>Herb Stratum</u> (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody Vine – All woody vines greater than 3.28 ft in height. Hydrophytic Vegetation Present? Yes <u> </u> No <u> X </u>																
1. <u>Schedonorus arundinaceus</u>	<u>30</u>	Yes	FACU																	
2. <u>Ranunculus bulbosus</u>	<u>20</u>	Yes	FAC																	
3. <u>Cynodon dactylon</u>	<u>20</u>	Yes	FACU																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
10. _____	_____	_____	_____																	
=Total Cover																				
50% of total cover: <u>35</u>		20% of total cover: <u>14</u>																		
<u>Woody Vine Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
=Total Cover																				
50% of total cover: _____		20% of total cover: _____																		

Remarks: (Include photo numbers here or on a separate sheet.)
 Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP 8-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	10YR 4/1	85	10YR 5/8	15	C	PL/M	Loamy/Clayey	
7-12	10YR 6/1	85	10YR 6/8	15	C	PL/M	Loamy/Clayey	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Red Parent Material (F21)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> (outside MLRA 127, 147, 148)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Very Shallow Dark Surface (F22)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	³ Indicators of hydrophytic vegetation and
<input type="checkbox"/> Stripped Matrix (S6)	wetland hydrology must be present,
<input type="checkbox"/> Dark Surface (S7)	unless disturbed or problematic.

Restrictive Layer (if observed):	Hydric Soil Present?
Type: _____	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Depth (inches): _____	

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/27/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP9-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.644483 Long: -79.388112 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP9-Upland

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Schedonorus arundinaceus</u>	<u>50</u>	<u>Yes</u>	<u>FACU</u>
2. <u>Ranunculus bulbosus</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>40</u> 20% of total cover: <u>16</u>			

Woody Vine Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>30</u>	x 3 = <u>90</u>
FACU species <u>50</u>	x 4 = <u>200</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>80</u> (A)	<u>290</u> (B)
Prevalence Index = B/A = <u>3.63</u>	

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0¹

___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet.)
Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP9-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	10YR 4/2	85	10YR 5/6	15	C	M	Loamy/Clayey	
8-12	10YR 6/1	70	10YR 6/6	30	C	M	Loamy/Clayey	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/27/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP10-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.643440 Long: -79.387608 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u> Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>x</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP10-Upland

<u>Tree Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.0%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
_____ = Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%; text-align: center;">Total % Cover of:</td> <td style="width:50%; text-align: center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>100</u></td> <td>x 4 = <u>400</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>100</u> (A)</td> <td><u>400</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>4.00</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>100</u>	x 4 = <u>400</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>100</u> (A)	<u>400</u> (B)	Prevalence Index = B/A = <u>4.00</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>0</u>	x 3 = <u>0</u>																			
FACU species <u>100</u>	x 4 = <u>400</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>100</u> (A)	<u>400</u> (B)																			
Prevalence Index = B/A = <u>4.00</u>																				
50% of total cover: _____ 20% of total cover: _____																				
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15</u>)				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)																
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
_____ = Total Cover																				
50% of total cover: _____ 20% of total cover: _____																				
<u>Herb Stratum</u> (Plot size: <u>5</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody Vine – All woody vines greater than 3.28 ft in height.																
1. <u>Schedonorus arundinaceus</u>	<u>100</u>	<u>Yes</u>	<u>FACU</u>																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
10. _____	_____	_____	_____																	
11. _____	_____	_____	_____																	
_____ = Total Cover																				
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>																				
<u>Woody Vine Stratum</u> (Plot size: <u>30</u>)				Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>																
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
_____ = Total Cover																				
50% of total cover: _____ 20% of total cover: _____																				

Remarks: (Include photo numbers here or on a separate sheet.)
 Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP10-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	10YR 4/1	90	10YR 5/6	10	C	M	Loamy/Clayey	
7-12	10YR 5/2	90	10YR 5/6	10	C	M	Loamy/Clayey	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/27/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP11-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.642455 Long: -79.387546 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u> Hydric Soil Present? Yes _____ No <u>X</u> Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
--	--

Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP11-Upland

Tree Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	_____ = Total Cover		
	50% of total cover: _____	20% of total cover: _____	

Sapling/Shrub Stratum (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
	_____ = Total Cover		
	50% of total cover: _____	20% of total cover: _____	

Herb Stratum (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Schedonorus arundinaceus</u>	<u>50</u>	<u>Yes</u>	<u>FACU</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
	<u>50</u> = Total Cover		
	50% of total cover: <u>25</u>	20% of total cover: <u>10</u>	

Woody Vine Stratum (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
	_____ = Total Cover		
	50% of total cover: _____	20% of total cover: _____	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>0</u>	x 1 = <u>0</u>
FACW species <u>0</u>	x 2 = <u>0</u>
FAC species <u>0</u>	x 3 = <u>0</u>
FACU species <u>50</u>	x 4 = <u>200</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>50</u> (A)	<u>200</u> (B)
Prevalence Index = B/A = <u>4.00</u>	

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

 2 - Dominance Test is >50%

 3 - Prevalence Index is ≤3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)
Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP11-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-9	10YR 4/3	100					Loamy/Clayey	
9-12	2.5Y 6/4	90	10YR 5/6	10	C	M	Loamy/Clayey	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Mucky Mineral (F1) **(MLRA 136)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 122, 136)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	<i>Requirement Control Symbol</i> EXEMPT <i>(Authority: AR 335-15, paragraph 5-2a)</i>
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Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 3/27/19
 Applicant/Owner: Wildlands Engineering State: NC Sampling Point: DP12-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): <1%
 Subregion (LRR or MLRA): LRR P, MLRA 136 Lat: 35.640401 Long: -79.387108 Datum: _____
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No X (If no, explain in Remarks.)
 Are Vegetation X, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No <u>X</u> Hydric Soil Present? Yes _____ No <u>X</u> Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Remarks: Above Normal Rainfall.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
--	--

Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP12-Upland

<u>Tree Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50.0%</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
=Total Cover				Prevalence Index worksheet: <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Total % Cover of:</td> <td style="width:50%;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>50</u></td> <td>x 3 = <u>150</u></td> </tr> <tr> <td>FACU species <u>50</u></td> <td>x 4 = <u>200</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>100</u> (A)</td> <td><u>350</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>3.50</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>50</u>	x 3 = <u>150</u>	FACU species <u>50</u>	x 4 = <u>200</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>100</u> (A)	<u>350</u> (B)	Prevalence Index = B/A = <u>3.50</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x 1 = <u>0</u>																			
FACW species <u>0</u>	x 2 = <u>0</u>																			
FAC species <u>50</u>	x 3 = <u>150</u>																			
FACU species <u>50</u>	x 4 = <u>200</u>																			
UPL species <u>0</u>	x 5 = <u>0</u>																			
Column Totals: <u>100</u> (A)	<u>350</u> (B)																			
Prevalence Index = B/A = <u>3.50</u>																				
50% of total cover: _____		20% of total cover: _____																		
<u>Sapling/Shrub Stratum</u> (Plot size: <u>15</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)																
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
=Total Cover																				
50% of total cover: _____		20% of total cover: _____																		
<u>Herb Stratum</u> (Plot size: <u>5</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody Vine – All woody vines greater than 3.28 ft in height. Hydrophytic Vegetation Present? Yes <u>X</u> No <u>X</u>																
1. <u>Schedonorus arundinaceus</u>	40	Yes	FACU																	
2. <u>Ranunculus bulbosus</u>	50	Yes	FAC																	
3. <u>Eupatorium capillifolium</u>	10	No	FACU																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
9. _____	_____	_____	_____																	
10. _____	_____	_____	_____																	
11. _____	_____	_____	_____																	
=Total Cover																				
50% of total cover: <u>50</u>		20% of total cover: <u>20</u>																		
<u>Woody Vine Stratum</u> (Plot size: <u>30</u>)	Absolute % Cover	Dominant Species?	Indicator Status																	
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
=Total Cover																				
50% of total cover: _____		20% of total cover: _____																		

Remarks: (Include photo numbers here or on a separate sheet.)
 Vegetation affected by pasture management and livestock grazing.

SOIL

Sampling Point: DP12-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 5/3	49	10YR 6/8	2	C	M	Loamy/Clayey	Disturbed

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (MLRA 136)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Red Parent Material (F21)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> (outside MLRA 127, 147, 148)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	<input type="checkbox"/> Very Shallow Dark Surface (F22)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N,	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> MLRA 136)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 122, 136)	³ Indicators of hydrophytic vegetation and
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	wetland hydrology must be present,
<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147, 148)	unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <u>X</u>
---	---

Remarks:
 Remaining 49% of soil color is 10YR 4/4. It appears surface and subsurface horizons were mixed or fill material was discharged.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 2019-05-02
 Applicant/Owner: Wildlands Engineering State: North Carolina Sampling Point: DP 13-Wetland M
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 1
 Subregion (LRR or MLRA): 136 Lat: 35.640849 Long: -79.387964 Datum: NAD 83
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) ___ Other (Explain in Remarks) <input checked="" type="checkbox"/> Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
--	--

Field Observations: Surface Water Present? Yes ___ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes ___ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No ___ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No ___
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: DP 13-Wetland M

<p><u>Tree Stratum</u> (Plot size: <u>2827.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:5%;"></th> <th style="width:35%; text-align: center;">Absolute % Cover</th> <th style="width:15%; text-align: center;">Dominant Species?</th> <th style="width:15%; text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr> <td></td> <td style="text-align: center;"><u>0</u> = Total Cover</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">50% of total cover: _____</td> <td style="text-align: center;">20% of total cover: _____</td> <td></td> </tr> </tbody> </table> <p><u>Sapling Stratum</u> (Plot size: <u>707.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr> <td></td> <td style="text-align: center;"><u>0</u> = Total Cover</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">50% of total cover: _____</td> <td style="text-align: center;">20% of total cover: _____</td> <td></td> </tr> </tbody> </table> <p><u>Shrub Stratum</u> (Plot size: <u>707.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr> <td></td> <td style="text-align: center;"><u>0</u> = Total Cover</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">50% of total cover: _____</td> <td style="text-align: center;">20% of total cover: _____</td> <td></td> </tr> </tbody> </table> <p><u>Herb Stratum</u> (Plot size: <u>79.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:5%;"></th> <th style="width:35%; text-align: center;">Absolute % Cover</th> <th style="width:15%; text-align: center;">Dominant Species?</th> <th style="width:15%; text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1.</td><td style="text-align: center;">25</td><td style="text-align: center;">✓</td><td style="text-align: center;">FAC</td></tr> <tr><td>2.</td><td style="text-align: center;">45</td><td style="text-align: center;">✓</td><td style="text-align: center;">FACU</td></tr> <tr><td>3.</td><td style="text-align: center;">10</td><td></td><td style="text-align: center;">FACW</td></tr> <tr><td>4.</td><td style="text-align: center;">20</td><td style="text-align: center;">✓</td><td style="text-align: center;">OBL</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>7.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>8.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>9.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>10.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>11.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr> <td></td> <td style="text-align: center;"><u>100</u> = Total Cover</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">50% of total cover: _____</td> <td style="text-align: center;">20% of total cover: _____</td> <td></td> </tr> </tbody> </table> <p><u>Woody Vine Stratum</u> (Plot size: <u>707.00 Meters Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr> <td></td> <td style="text-align: center;"><u>0</u> = Total Cover</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">50% of total cover: _____</td> <td style="text-align: center;">20% of total cover: _____</td> <td></td> </tr> </tbody> </table>		Absolute % Cover	Dominant Species?	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(7.6 cm) or larger in diameter at breast height (DBH).</p> <p>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</p> <p>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</p> <p>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.</p> <p>Woody vine – All woody vines, regardless of height.</p> <hr/> <p>Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____</p>	Total % Cover of:	Multiply by:	OBL species <u>20</u>	x 1 = <u>20</u>	FACW species <u>10</u>	x 2 = <u>20</u>	FAC species <u>25</u>	x 3 = <u>75</u>	FACU species <u>45</u>	x 4 = <u>180</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>100</u> (A)	<u>295</u> (B)
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SOIL

Sampling Point: DP 13-Wetland M

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0.0 12.0	10YR 5/1	75.0	10YR 5/6	25.0	C	Both	Loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
---	--

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Sandy Branch Mitigation Site City/County: Bear Creek/Chatham Sampling Date: 2019-05-02
 Applicant/Owner: Wildlands Engineering State: North Carolina Sampling Point: DP 14-Upland
 Investigator(s): C. Neaves Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0
 Subregion (LRR or MLRA): 136 Lat: 35.640775 Long: -79.387949 Datum: NAD 83
 Soil Map Unit Name: Cid-Lignum complex NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: DP 14-Upland

<p><u>Tree Stratum</u> (Plot size: <u>2827.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:5%;"></th> <th style="width:35%; text-align: center;">Absolute % Cover</th> <th style="width:20%; text-align: center;">Dominant Species?</th> <th style="width:20%; text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td colspan="4" style="text-align: right;">0 _____ = Total Cover</td></tr> <tr><td colspan="4" style="text-align: center;">50% of total cover: _____ 20% of total cover: _____</td></tr> </tbody> </table> <p><u>Sapling Stratum</u> (Plot size: <u>707.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td colspan="4" style="text-align: right;">0 _____ = Total Cover</td></tr> <tr><td colspan="4" style="text-align: center;">50% of total cover: _____ 20% of total cover: _____</td></tr> </tbody> </table> <p><u>Shrub Stratum</u> (Plot size: <u>707.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>6.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td colspan="4" style="text-align: right;">0 _____ = Total Cover</td></tr> <tr><td colspan="4" style="text-align: center;">50% of total cover: _____ 20% of total cover: _____</td></tr> </tbody> </table> <p><u>Herb Stratum</u> (Plot size: <u>76.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1.</td><td><u>Schedonorus arundinaceus</u></td><td style="text-align: center;">75</td><td style="text-align: center;">✓</td><td style="text-align: center;">FACU</td></tr> <tr><td>2.</td><td><u>Trifolium repens</u></td><td style="text-align: center;">5</td><td></td><td style="text-align: center;">FACU</td></tr> <tr><td>3.</td><td><u>Ranunculus sardous</u></td><td style="text-align: center;">15</td><td></td><td style="text-align: center;">FAC</td></tr> <tr><td>4.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td>5.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td>6.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td>7.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td>8.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td>9.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td>10.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td>11.</td><td>_____</td><td></td><td></td><td></td></tr> <tr><td colspan="4" style="text-align: right;">95 _____ = Total Cover</td></tr> <tr><td colspan="4" style="text-align: center;">50% of total cover: _____ 20% of total cover: _____</td></tr> </tbody> </table> <p><u>Woody Vine Stratum</u> (Plot size: <u>707.00 Feet Sq.</u>)</p> <table style="width:100%; border-collapse: collapse;"> <tbody> <tr><td>1.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>2.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>3.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>4.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>5.</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td colspan="4" style="text-align: right;">0 _____ = Total Cover</td></tr> <tr><td colspan="4" style="text-align: center;">50% of total cover: _____ 20% of total cover: _____</td></tr> </tbody> </table>		Absolute % Cover	Dominant Species?	Indicator Status	1.	_____	_____	_____	2.	_____	_____	_____	3.	_____	_____	_____	4.	_____	_____	_____	5.	_____	_____	_____	6.	_____	_____	_____	0 _____ = Total Cover				50% of total cover: _____ 20% of total cover: _____				1.	_____	_____	_____	2.	_____	_____	_____	3.	_____	_____	_____	4.	_____	_____	_____	5.	_____	_____	_____	6.	_____	_____	_____	0 _____ = Total Cover				50% of total cover: _____ 20% of total cover: _____				1.	_____	_____	_____	2.	_____	_____	_____	3.	_____	_____	_____	4.	_____	_____	_____	5.	_____	_____	_____	6.	_____	_____	_____	0 _____ = Total Cover				50% of total cover: _____ 20% of total cover: _____				1.	<u>Schedonorus arundinaceus</u>	75	✓	FACU	2.	<u>Trifolium repens</u>	5		FACU	3.	<u>Ranunculus sardous</u>	15		FAC	4.	_____				5.	_____				6.	_____				7.	_____				8.	_____				9.	_____				10.	_____				11.	_____				95 _____ = Total Cover				50% of total cover: _____ 20% of total cover: _____				1.	_____	_____	_____	2.	_____	_____	_____	3.	_____	_____	_____	4.	_____	_____	_____	5.	_____	_____	_____	0 _____ = Total Cover				50% of total cover: _____ 20% of total cover: _____				<p>Dominance Test worksheet:</p> <p>Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A)</p> <p>Total Number of Dominant Species Across All Strata: <u>1</u> (B)</p> <p>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u> (A/B)</p> <hr/> <p>Prevalence Index worksheet:</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%; text-align: center;">Total % Cover of:</th> <th style="width:50%; text-align: center;">Multiply by:</th> </tr> </thead> <tbody> <tr><td>OBL species <u>0</u></td><td style="text-align: center;">x 1 = <u>0</u></td></tr> <tr><td>FACW species <u>0</u></td><td style="text-align: center;">x 2 = <u>0</u></td></tr> <tr><td>FAC species <u>15</u></td><td style="text-align: center;">x 3 = <u>45</u></td></tr> <tr><td>FACU species <u>80</u></td><td style="text-align: center;">x 4 = <u>320</u></td></tr> <tr><td>UPL species <u>0</u></td><td style="text-align: center;">x 5 = <u>0</u></td></tr> <tr><td>Column Totals: <u>95</u> (A)</td><td style="text-align: center;"><u>365</u> (B)</td></tr> </tbody> </table> <p style="text-align: center;">Prevalence Index = B/A = <u>3.84</u></p> <hr/> <p>Hydrophytic Vegetation Indicators:</p> <p><input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation</p> <p><input type="checkbox"/> 2 - Dominance Test is >50%</p> <p><input type="checkbox"/> 3 - Prevalence Index is ≤3.0¹</p> <p><input type="checkbox"/> 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)</p> <p><input type="checkbox"/> Problematic Hydrophytic Vegetation¹ (Explain)</p> <p>¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.</p> <hr/> <p>Definitions of Five Vegetation Strata:</p> <p>Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).</p> <p>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</p> <p>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</p> <p>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.</p> <p>Woody vine – All woody vines, regardless of height.</p> <hr/> <p>Hydrophytic Vegetation Present? Yes _____ No <input checked="" type="checkbox"/></p>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x 1 = <u>0</u>	FACW species <u>0</u>	x 2 = <u>0</u>	FAC species <u>15</u>	x 3 = <u>45</u>	FACU species <u>80</u>	x 4 = <u>320</u>	UPL species <u>0</u>	x 5 = <u>0</u>	Column Totals: <u>95</u> (A)	<u>365</u> (B)
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SOIL

Sampling Point: DP 14-Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0.0 12.0	10YR 5/1	90.0	10YR 5/6	10.0	C	Both	Loam	Drained by incised stream.

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)	
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

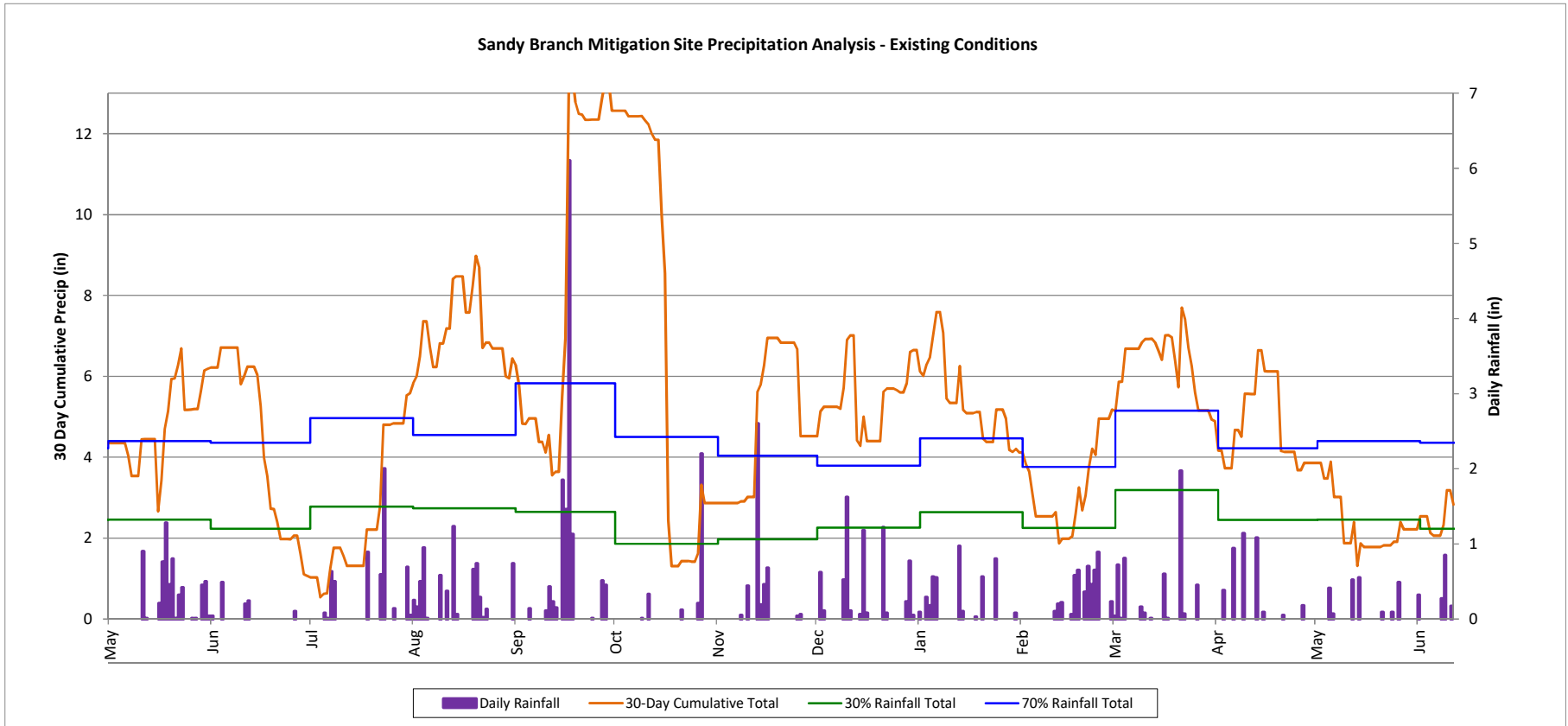
Remarks:
 Drained by incised stream.

Appendix 5

Existing Groundwater Hydrographs

Monthly Rainfall Data

Sandy Branch Mitigation Site
DMS Project No. 100060
Existing Conditions 2018-2019



¹ 2018 monthly rainfall collected from weather station Siler City 2 N (317924)

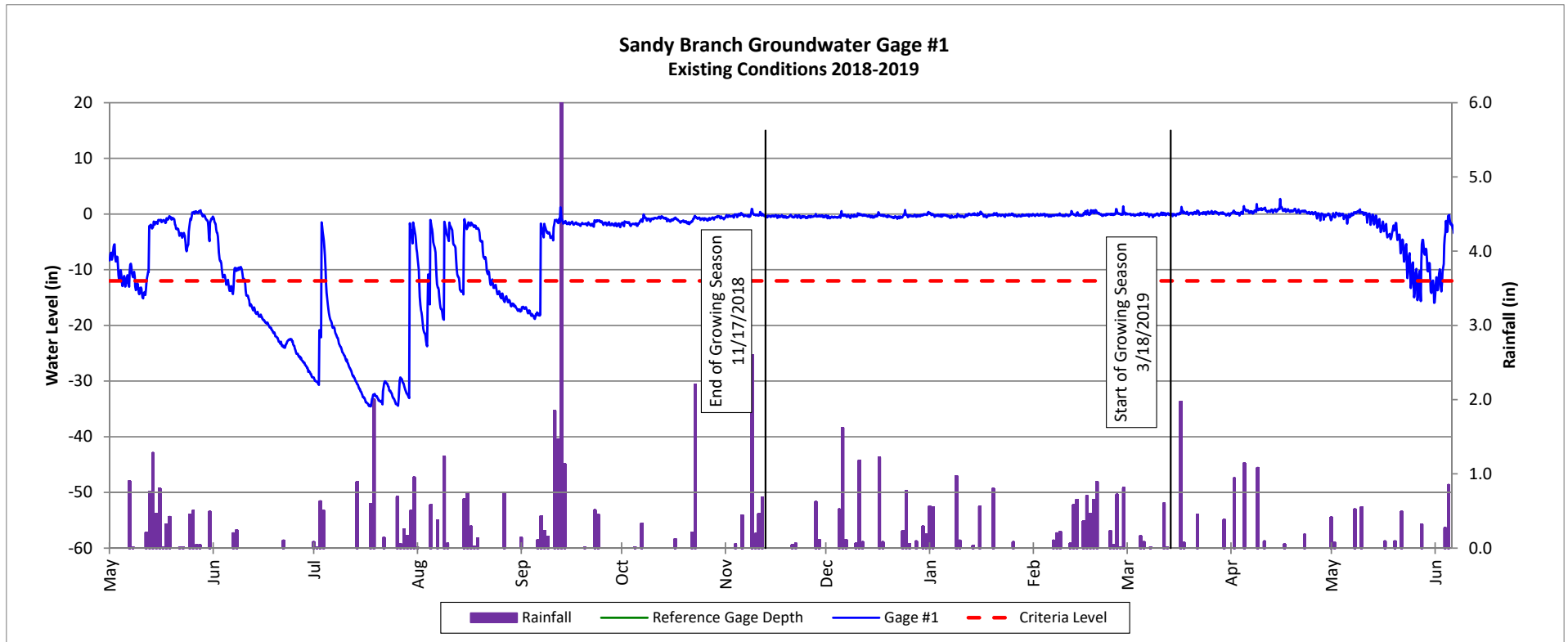
² 30th and 70th percentile rainfall data collected from weather station Siler City 2 N (317924)

Groundwater Gage Plots

Sandy Branch Mitigation Site

DMS Project No. 100060

Existing Conditions 2018-2019

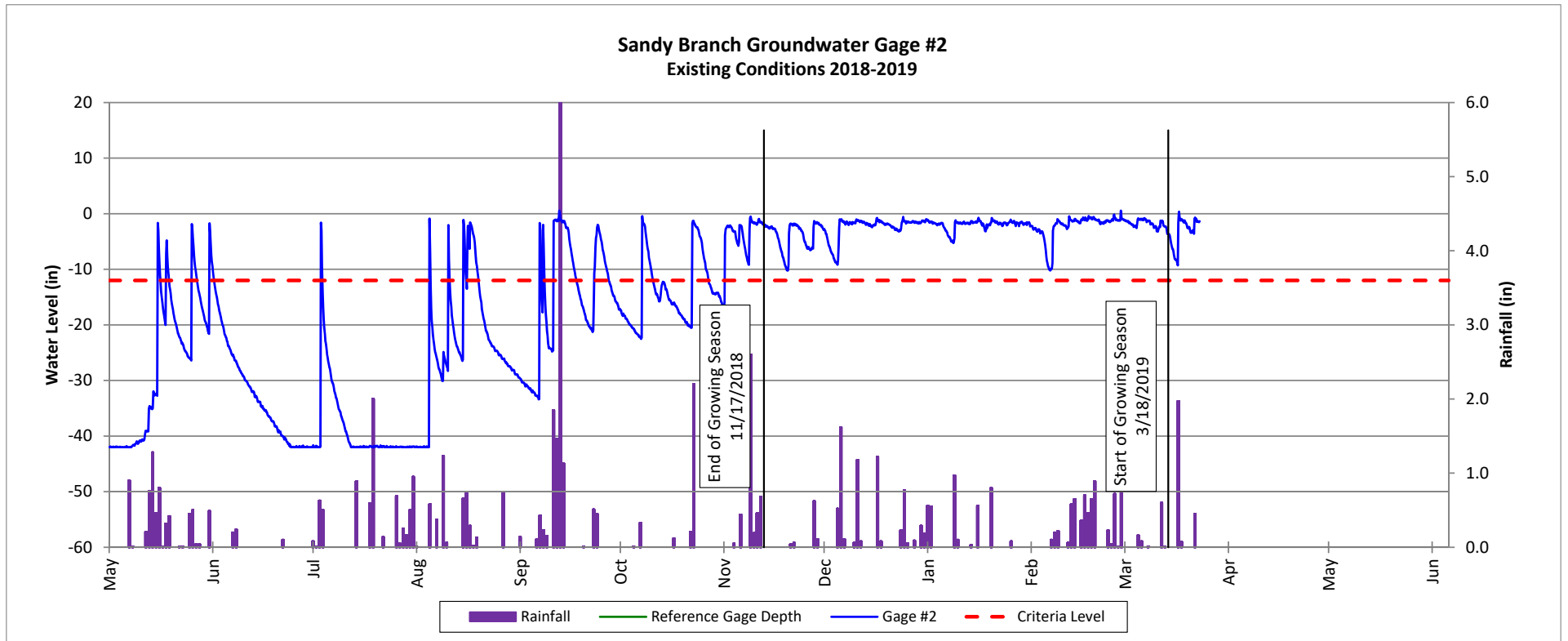


Groundwater Gage Plots

Sandy Branch Mitigation Site

DMS Project No. 100060

Existing Conditions 2018-2019

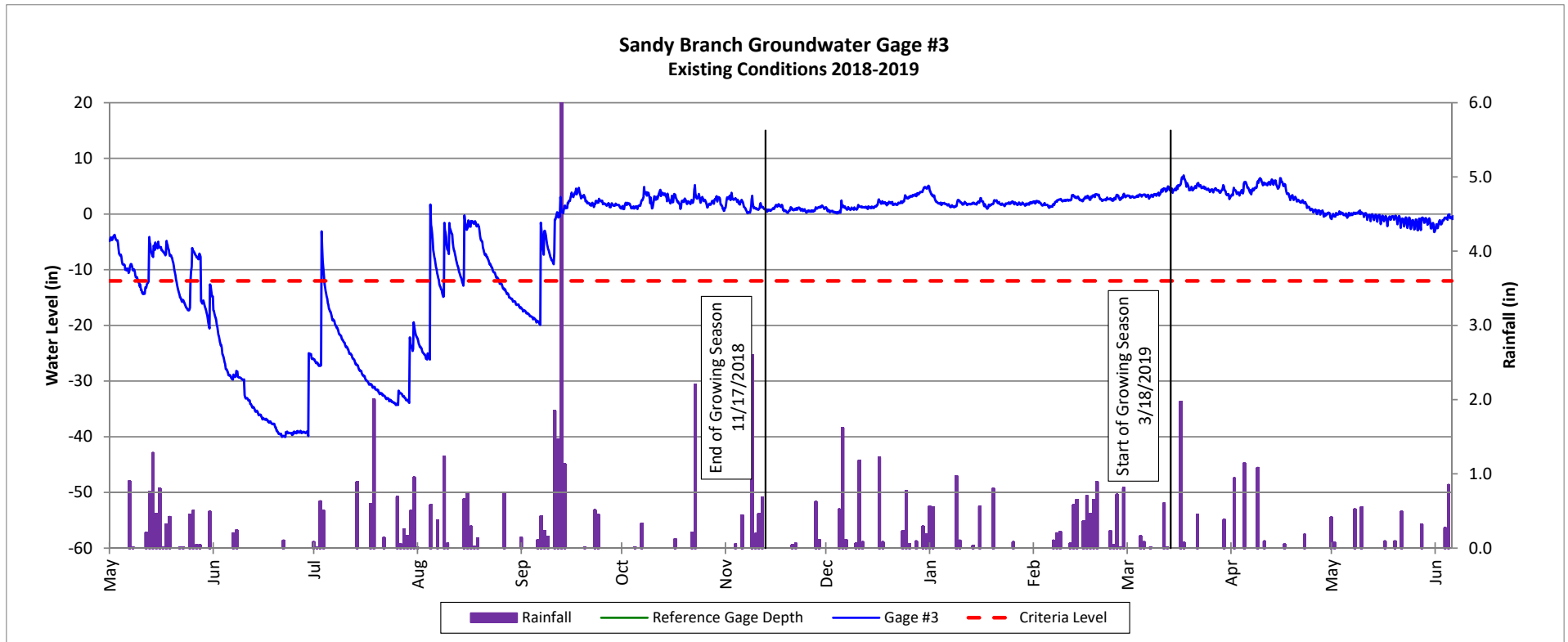


Groundwater Gage Plots

Sandy Branch Mitigation Site

DMS Project No. 100060

Existing Conditions 2018-2019

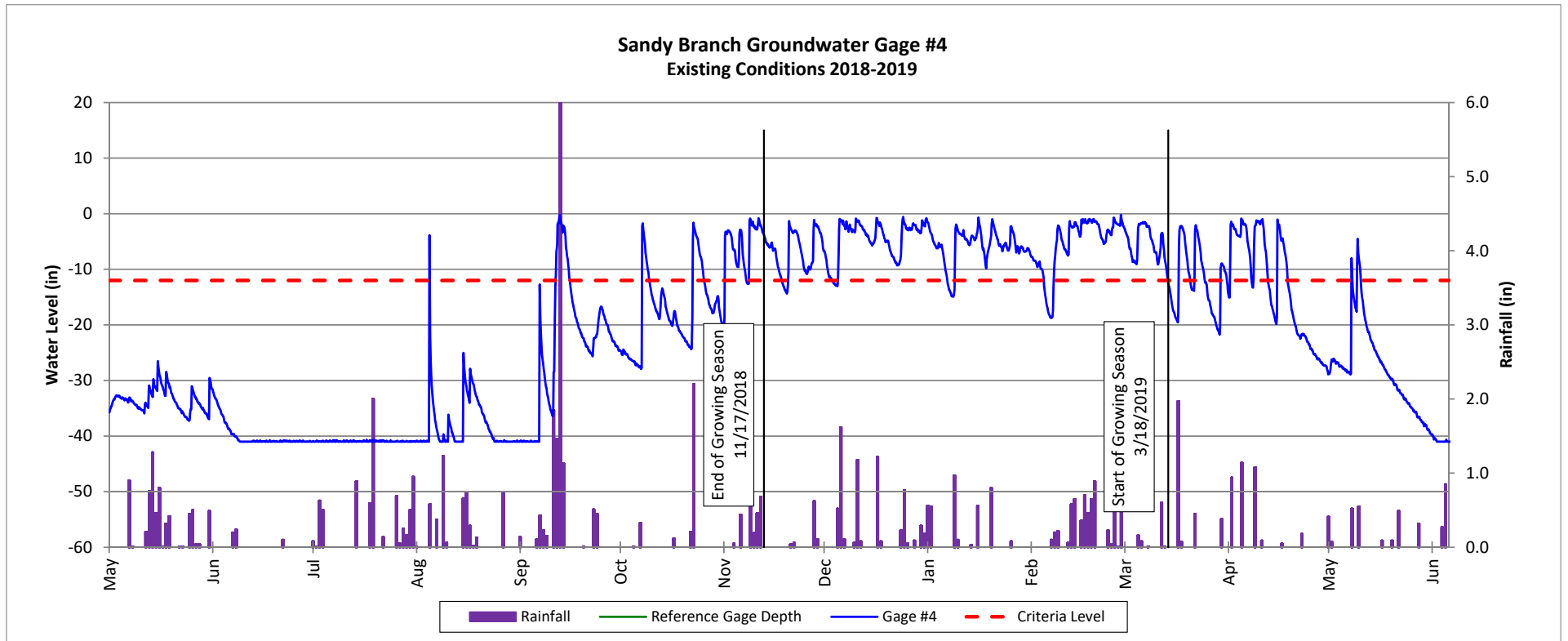


Groundwater Gage Plots

Sandy Branch Mitigation Site

DMS Project No. 100060

Existing Conditions 2018-2019

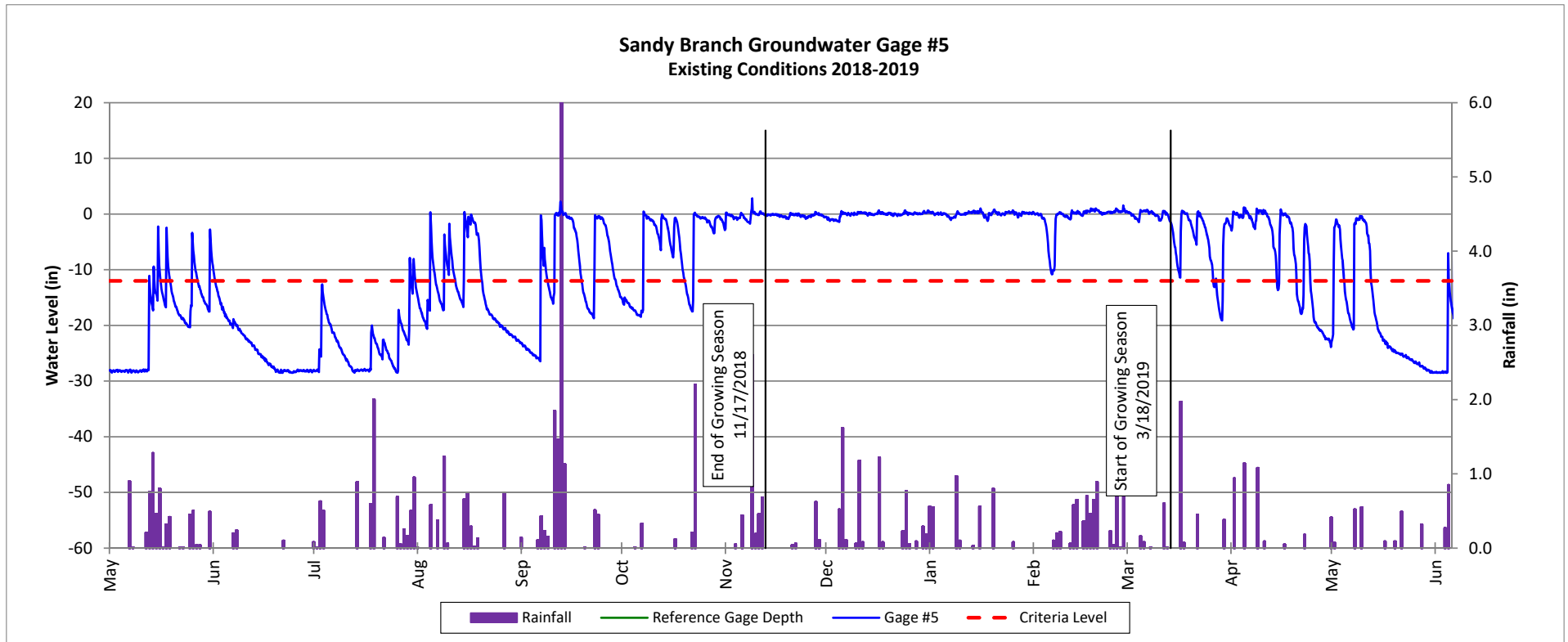


Groundwater Gage Plots

Sandy Branch Mitigation Site

DMS Project No. 100060

Existing Conditions 2018-2019



Appendix 6

Stream and Wetland Identification and Assessment Forms

DWR Stream Classification

The results of the DWR Stream Classification Forms are listed in the table below. DWR forms can be found in this appendix and in the digital submission to DMS. DWR forms were completed by Wildlands for all on-site streams.

Table 1: DWR Form Summary – Sandy Branch Mitigation Site

Stream	Geomorphology Score	Hydrology Score	Biology Score	Total Score
Sandy Branch	26	10	12	48.0
UT1	25	9.5	10	44.5
UT2	25	9.5	11	45.5

NC DWQ Stream Identification Form Version 4.11

Sandy

Date: <u>V29/19</u>	Project/Site: <u>Sandy Branch</u>	Latitude: <u>35.645478</u>
Evaluator: <u>C. Neaves</u>	County: <u>Chatham</u>	Longitude: <u>-79.387977</u>
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ <u>48</u>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other UT to <u>Sandy Branch</u> e.g. Quad Name:

A. Geomorphology (Subtotal = 26)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	2	<u>3</u>
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	<u>3</u>
4. Particle size of stream substrate	0	1	2	<u>3</u>
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	2	<u>3</u>
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	0.5	1	<u>1.5</u>
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	No = 0		Yes = <u>3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10)

12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = <u>3</u>	

C. Biology (Subtotal = 12)

18. Fibrous roots in streambed	<u>3</u>	2	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	0	<u>1</u>	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = <u>1.5</u> ; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

photo 786

UT1

NC DWQ Stream Identification Form Version 4.11

Date: 1/29/19	Project/Site: Sandy Branch	Latitude: 35.643880
Evaluator: C. Neaves	County: Chatham	Longitude: -79.387090
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 44.5	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name: UT1

A. Geomorphology (Subtotal = 25)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 10)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

photo 765

UT2

NC DWQ Stream Identification Form Version 4.11

Date: 1/29/19	Project/Site: Sandy Branch	Latitude: 35.640448
Evaluator: C. Neaves	County: Chatham	Longitude: -79.387612
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 45.5	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other UT2 e.g. Quad Name:

A. Geomorphology (Subtotal = 25)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

^aartificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 11)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

Blank area for sketching the stream channel and surrounding features.

photo 784

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p>	
PROJECT / SITE INFORMATION:	
1. Project name (if any):	Sandy Branch - UT Sandy Branch R1
2. Date of evaluation:	6/11/19
3. Applicant/owner name:	Wildlands Engineering
4. Assessor name/organization:	C. Lanza
5. County:	Chatham
6. Nearest named water body	Sandy Branch
7. River Basin:	Cape Fear
8. Site coordinates (decimal degrees, at lower end of assessment reach):	
STREAM INFORMATION: (depth and width can be approximations)	
9. Site number (show on attached map):	UT Sandy Branch R1
10. Length of assessment reach evaluated (feet):	3
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet):	6
13. Is assessment reach a swamp stream?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
14. Feature type:	<input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream
STREAM RATING INFORMATION:	
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <input checked="" type="checkbox"/> a (more sinuous stream, flatter valley slope) </div> <div style="text-align: center;"> <input type="checkbox"/> b (less sinuous stream, steeper valley slope) </div> </div>
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input checked="" type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)
ADDITIONAL INFORMATION:	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)
<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters
<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	<input type="checkbox"/> Nutrient Sensitive Waters
List species: _____	<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.
<input type="checkbox"/> Designated Critical Habitat (list species): _____	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A.

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. **Streamside Area Interaction – streamside area metric**
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="checkbox"/> C	<input type="checkbox"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: _____ (explain in "Notes/Sketch" section)
- J Little to no stressors

8. Recent Weather – watershed metric

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? **If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).**

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. Check all that occur (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation <input type="checkbox"/> C Multiple snags and logs (including lap trees) <input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter <input type="checkbox"/> E Little or no habitat | Check for Tidal
Marsh Streams
only | <ul style="list-style-type: none"> <input type="checkbox"/> F 5% oysters or other natural hard bottoms <input type="checkbox"/> G Submerged aquatic vegetation <input type="checkbox"/> H Low-tide refugia (pools) <input type="checkbox"/> I Sand bottom <input type="checkbox"/> J 5% vertical bank along the marsh <input type="checkbox"/> K Little or no habitat |
|---|--|---|

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams).** Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bedrock/saprolite
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boulder (256 – 4096 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cobble (64 – 256 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gravel (2 – 64 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sand (.062 – 2 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Silt/clay (< 0.062 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Detritus
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.

No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles (including water pennies)
 - Caddisfly larvae (Trichoptera [T])
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans (true flies)
 - Mayfly larvae (Ephemeroptera [E])
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish

- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|----------------------------|----------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|---|
| Vegetated | | Wooded | | |
| LB | RB | LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100-feet wide or extends to the edge of the watershed |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | From 50 to < 100-feet wide |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | From 30 to < 50-feet wide |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 30-feet wide |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | < 10-feet wide or no trees |

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- | | | |
|----------------------------|----------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Mature forest |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Non-mature woody vegetation or modified vegetation structure |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Herbaceous vegetation with or without a strip of trees < 10 feet wide |
| <input type="checkbox"/> D | <input type="checkbox"/> D | Maintained shrubs |
| <input type="checkbox"/> E | <input type="checkbox"/> E | Little or no vegetation |

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

- If none of the following stressors occurs on either bank, check here and skip to Metric 22:**
- | | | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--|
| Abuts | | < 30 feet | | 30-50 feet | | |
| LB | RB | LB | RB | LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Row crops |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Maintained turf |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Pasture (no livestock)/commercial horticulture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | Pasture (active livestock use) |

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

- | | | |
|----------------------------|----------------------------|-----------------------------|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Medium to high stem density |

- B B Low stem density
 C C No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

- LB RB
 A A The total length of buffer breaks is < 25 percent.
 B B The total length of buffer breaks is between 25 and 50 percent.
 C C The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

- LB RB
 A A Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
 B B Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
 C C Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was a conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

- A <46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Livestock have access to stream. Large privet lines the stream banks but there is not a lot of other species.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Sandy Branch
 Stream Category Pa3

Date of Evaluation 6/11/19
 Assessor Name/Organization C. Lanza

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology		
(2) Baseflow	MEDIUM	
(2) Flood Flow		
(3) Streamside Area Attenuation		
(4) Floodplain Access	MEDIUM	
(4) Wooded Riparian Buffer		
(4) Microtopography	LOW	
(3) Stream Stability	MEDIUM	
(4) Channel Stability	LOW	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	MEDIUM	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	MEDIUM	
(2) Streamside Area Vegetation	LOW	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	MEDIUM	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	MEDIUM	
(3) Baseflow	MEDIUM	
(3) Substrate	HIGH	
(3) Stream Stability	LOW	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
Overall		

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:
INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.	
NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).	
PROJECT / SITE INFORMATION:	
1. Project name (if any):	Sandy Branch - UT Sandy Branch R2
2. Date of evaluation:	6/11/19
3. Applicant/owner name:	Wildlands Engineering
4. Assessor name/organization:	C. Lanza
5. County:	Chatham
6. Nearest named water body on USGS 7.5-minute quad:	Sandy Branch
7. River Basin:	Cape Fear
8. Site coordinates (decimal degrees, at lower end of assessment reach):	
STREAM INFORMATION: (depth and width can be approximations)	
9. Site number (show on attached map):	UT Sandy Branch R2
10. Length of assessment reach evaluated (feet):	4
11. Channel depth from bed (in riffle, if present) to top of bank (feet):	9
12. Channel width at top of bank (feet):	4
13. Is assessment reach a swamp stream?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14. Feature type:	<input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream
STREAM RATING INFORMATION:	
15. NC SAM Zone:	<input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):	<input checked="" type="checkbox"/> a (more sinuous stream, flatter valley slope) <input type="checkbox"/> b (less sinuous stream, steeper valley slope)
17. Watershed size: (skip for Tidal Marsh Stream)	<input type="checkbox"/> Size 1 (< 0.1 mi ²) <input type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input checked="" type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)
ADDITIONAL INFORMATION:	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)
<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters
<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	
List species:	
<input type="checkbox"/> Designated Critical Habitat (list species):	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**

A Water throughout assessment reach.

B No flow, water in pools only.

C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**

A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).

B Not A

3. **Feature Pattern – assessment reach metric**

A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).

B Not A

4. **Feature Longitudinal Profile – assessment reach metric**

A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).

B Not A

5. **Signs of Active Instability – assessment reach metric**

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

A < 10% of channel unstable

B 10 to 25% of channel unstable

C > 25% of channel unstable

6. **Streamside Area Interaction – streamside area metric**

Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="checkbox"/> C	<input type="checkbox"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] or too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) or floodplain/intertidal zone unnaturally absent or assessment reach is a man-made feature on an interstream divide

7. **Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)

B Excessive sedimentation (burying of stream features or intertidal zone)

C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem

D Odor (not including natural sulfide odors)

E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.

F Livestock with access to stream or intertidal zone

G Excessive algae in stream or intertidal zone

H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)

I Other: _____ (explain in "Notes/Sketch" section)

J Little to no stressors

8. Recent Weather – watershed metric

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
B Multiple sticks and/or leaf packs and/or emergent vegetation
C Multiple snags and logs (including lap trees)
D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter
E Little or no habitat
F 5% oysters or other natural hard bottoms
G Submerged aquatic vegetation
H Low-tide refugia (pools)
I Sand bottom
J 5% vertical bank along the marsh
K Little or no habitat

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
B Pool-glide section (evaluate 11d)
C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged.

Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

Table with columns NP, R, C, A, P and rows for Bedrock/saprolite, Boulder (256 – 4096 mm), Cobble (64 – 256 mm), Gravel (2 – 64 mm), Sand (.062 – 2 mm), Silt/clay (< 0.062 mm), Detritus, Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13. No Water Other:

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.

- Adult frogs
Aquatic reptiles
Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
Beetles (including water pennies)
Caddisfly larvae (Trichoptera [T])
Asian clam (Corbicula)
Crustacean (isopod/amphipod/crayfish/shrimp)
Damselfly and dragonfly larvae
Dipterans (true flies)
Mayfly larvae (Ephemeroptera [E])
Megaloptera (alderfly, fishfly, dobsonfly larvae)
Midges/mosquito larvae
Mosquito fish (Gambusia) or mud minnows (Umbra pygmaea)
Mussels/Clams (not Corbicula)
Other fish
Salamanders/tadpoles
Snails
Stonefly larvae (Plecoptera [P])
Tipulid larvae
Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- A A Little or no alteration to water storage capacity over a majority of the streamside area
B B Moderate alteration to water storage capacity over a majority of the streamside area
C C Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes)

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- A A Majority of streamside area with depressions able to pond water ≥ 6 inches deep
B B Majority of streamside area with depressions able to pond water 3 to 6 inches deep
C C Majority of streamside area with depressions able to pond water < 3 inches deep

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- LB RB
Y Y Are wetlands present in the streamside area?
N N

16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
 B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
 C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
 D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
 E Stream bed or bank soil reduced (dig through deposited sediment if present)
 F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
 B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
 C Urban stream (≥ 24% impervious surface for watershed)
 D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
 E Assessment reach relocated to valley edge
 F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
 B Degraded (example: scattered trees)
 C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- Vegetated: LB RB LB RB
 A A ≥ 100-feet wide or extends to the edge of the watershed
 B B From 50 to < 100-feet wide
 C C From 30 to < 50-feet wide
 D D From 10 to < 30-feet wide
 E E < 10-feet wide or no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- LB RB
 A A Mature forest
 B B Non-mature woody vegetation or modified vegetation structure
 C C Herbaceous vegetation with or without a strip of trees < 10 feet wide
 D D Maintained shrubs
 E E Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22:

- Abuts < 30 feet 30-50 feet
LB RB LB RB LB RB
 A A A A A A Row crops
 B B B B B B Maintained turf
 C C C C C C Pasture (no livestock)/commercial horticulture
 D D D D D D Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

- LB RB
 A A Medium to high stem density
 B B Low stem density
 C C No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

- LB RB
 A A The total length of buffer breaks is < 25 percent.
 B B The total length of buffer breaks is between 25 and 50 percent.
 C C The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

- LB RB
 A A Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
 B B Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
 C C Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was a conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

- A <46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Livestock have access to stream. Large privet lines the stream banks at the top of the reach. Towards the bottom the stream goes through a semi fc

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Sandy Branch - UT Sandy Branch R2
 Stream Category Pa3

Date of Evaluation 6/11/19
 Assessor Name/Organization C. Lanza

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	HIGH	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	MEDIUM	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	LOW	
(4) Sediment Transport	LOW	
(4) Stream Geomorphology	MEDIUM	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	HIGH	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	LOW	
(2) In-stream Habitat	MEDIUM	
(3) Baseflow	HIGH	
(3) Substrate	MEDIUM	
(3) Stream Stability	LOW	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	MEDIUM	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p>	
PROJECT / SITE INFORMATION:	
1. Project name (if any): <u>Sandy Branch - UT1</u>	2. Date of evaluation: <u>6/11/19</u>
3. Applicant/owner name: <u>Wildlands Engineering</u>	4. Assessor name/organization: <u>C. Lanza</u>
5. County: <u>Chatham</u>	6. Nearest named water body
7. River Basin: <u>Cape Fear</u>	on USGS 7.5-minute quad: <u>Sandy Branch</u>
8. Site coordinates (decimal degrees, at lower end of assessment reach): _____	
STREAM INFORMATION: (depth and width can be approximations)	
9. Site number (show on attached map): <u>UT1</u>	10. Length of assessment reach evaluated (feet): _____
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>6</u>	13. Is assessment reach a swamp stream? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
STREAM RATING INFORMATION:	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> a (more sinuous stream, flatter valley slope) <input type="checkbox"/> b (less sinuous stream, steeper valley slope)	
17. Watershed size: (skip for Tidal Marsh Stream) <input type="checkbox"/> Size 1 (< 0.1 mi ²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)	
ADDITIONAL INFORMATION:	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)
<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters
<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)
List species: _____	
<input type="checkbox"/> Designated Critical Habitat (list species): _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A.

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. **Streamside Area Interaction – streamside area metric**
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="checkbox"/> C	<input type="checkbox"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: _____ (explain in "Notes/Sketch" section)
- J Little to no stressors

8. Recent Weather – watershed metric

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

Yes No Is stream is too large or dangerous to assess? **If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).**

10. Natural In-stream Habitat Types – assessment reach metric

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) **(evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)**

10b. Check all that occur (occurs if > 5% coverage of assessment reach) **(skip for Size 4 Coastal Plain streams)**

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation <input type="checkbox"/> C Multiple snags and logs (including lap trees) <input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter <input type="checkbox"/> E Little or no habitat | Check for Tidal
Marsh Streams
only | <ul style="list-style-type: none"> <input type="checkbox"/> F 5% oysters or other natural hard bottoms <input type="checkbox"/> G Submerged aquatic vegetation <input type="checkbox"/> H Low-tide refugia (pools) <input type="checkbox"/> I Sand bottom <input type="checkbox"/> J 5% vertical bank along the marsh <input type="checkbox"/> K Little or no habitat |
|---|--|---|

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. Yes No Is assessment reach in a natural sand-bed stream? **(skip for Coastal Plain streams)**

11b. Bedform evaluated. **Check the appropriate box(es).**

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent **(skip to Metric 12, Aquatic Life)**

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. **Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams).** Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bedrock/saprolite
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boulder (256 – 4096 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cobble (64 – 256 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gravel (2 – 64 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sand (.062 – 2 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Silt/clay (< 0.062 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Detritus
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? **(skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13. No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.

- Adult frogs
- Aquatic reptiles
- Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
- Beetles (including water pennies)
- Caddisfly larvae (Trichoptera [T])
- Asian clam (*Corbicula*)
- Crustacean (isopod/amphipod/crayfish/shrimp)
- Damselfly and dragonfly larvae
- Dipterans (true flies)
- Mayfly larvae (Ephemeroptera [E])
- Megaloptera (alderfly, fishfly, dobsonfly larvae)
- Midges/mosquito larvae
- Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
- Mussels/Clams (not *Corbicula*)
- Other fish

- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|----------------------------|----------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|---|
| Vegetated | | Wooded | | |
| LB | RB | LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100-feet wide or extends to the edge of the watershed |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | From 50 to < 100-feet wide |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | From 30 to < 50-feet wide |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 30-feet wide |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | < 10-feet wide or no trees |

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- | | | |
|----------------------------|----------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Mature forest |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Non-mature woody vegetation or modified vegetation structure |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Herbaceous vegetation with or without a strip of trees < 10 feet wide |
| <input type="checkbox"/> D | <input type="checkbox"/> D | Maintained shrubs |
| <input type="checkbox"/> E | <input type="checkbox"/> E | Little or no vegetation |

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

- If none of the following stressors occurs on either bank, check here and skip to Metric 22:**
- | | | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--|
| Abuts | | < 30 feet | | 30-50 feet | | |
| LB | RB | LB | RB | LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Row crops |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Maintained turf |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Pasture (no livestock)/commercial horticulture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | Pasture (active livestock use) |

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

- | | | |
|----------------------------|----------------------------|-----------------------------|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Medium to high stem density |

- B B Low stem density
 C C No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

- LB RB
 A A The total length of buffer breaks is < 25 percent.
 B B The total length of buffer breaks is between 25 and 50 percent.
 C C The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

- LB RB
 A A Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
 B B Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
 C C Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was a conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

- A <46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Livestock have access to stream. Only herbaceous vegetation along banks. Culvert upstream is failing.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Sandy Branch - UT1
 Stream Category Pa2

Date of Evaluation 6/11/19
 Assessor Name/Organization C. Lanza

Notes of Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>NO</u>
Additional stream information/supplementary measurements included (Y/N)	<u>YES</u>
NC SAM feature type (perennial, intermittent, Tidal Marsh Stream)	<u>Perennial</u>

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	MEDIUM	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	LOW	
(4) Floodplain Access	MEDIUM	
(4) Wooded Riparian Buffer	LOW	
(4) Microtopography	LOW	
(3) Stream Stability	MEDIUM	
(4) Channel Stability	LOW	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	MEDIUM	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	MEDIUM	
(2) Streamside Area Vegetation	LOW	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	MEDIUM	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	MEDIUM	
(2) In-stream Habitat	HIGH	
(3) Baseflow	MEDIUM	
(3) Substrate	HIGH	
(3) Stream Stability	LOW	
(3) In-stream Habitat	HIGH	
(2) Stream-side Habitat	LOW	
(3) Stream-side Habitat	LOW	
(3) Thermoregulation	LOW	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
Overall	LOW	

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #:	NCDWR #:
<p>INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.</p> <p>NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).</p>	
PROJECT / SITE INFORMATION:	
1. Project name (if any): <u>Sandy Branch - UT2</u>	2. Date of evaluation: <u>6/11/19</u>
3. Applicant/owner name: <u>Wildlands Engineering</u>	4. Assessor name/organization: <u>C. Lanza</u>
5. County: <u>Chatham</u>	6. Nearest named water body
7. River Basin: <u>Cape Fear</u>	on USGS 7.5-minute quad: <u>Sandy Branch</u>
8. Site coordinates (decimal degrees, at lower end of assessment reach): _____	
STREAM INFORMATION: (depth and width can be approximations)	
9. Site number (show on attached map): <u>UT2</u>	10. Length of assessment reach evaluated (feet): _____
11. Channel depth from bed (in riffle, if present) to top of bank (feet): <u>4</u>	<input type="checkbox"/> Unable to assess channel depth.
12. Channel width at top of bank (feet): <u>5</u>	13. Is assessment reach a swamp stream? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
14. Feature type: <input checked="" type="checkbox"/> Perennial flow <input type="checkbox"/> Intermittent flow <input type="checkbox"/> Tidal Marsh Stream	
STREAM RATING INFORMATION:	
15. NC SAM Zone: <input type="checkbox"/> Mountains (M) <input checked="" type="checkbox"/> Piedmont (P) <input type="checkbox"/> Inner Coastal Plain (I) <input type="checkbox"/> Outer Coastal Plain (O)	
16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream): <input checked="" type="checkbox"/> a (more sinuous stream, flatter valley slope) <input type="checkbox"/> b (less sinuous stream, steeper valley slope)	
17. Watershed size: (skip for Tidal Marsh Stream) <input type="checkbox"/> Size 1 (< 0.1 mi ²) <input checked="" type="checkbox"/> Size 2 (0.1 to < 0.5 mi ²) <input type="checkbox"/> Size 3 (0.5 to < 5 mi ²) <input type="checkbox"/> Size 4 (≥ 5 mi ²)	
ADDITIONAL INFORMATION:	
18. Were regulatory considerations evaluated? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, check all that apply to the assessment area.	
<input type="checkbox"/> Section 10 water	<input type="checkbox"/> Classified Trout Waters
<input type="checkbox"/> Essential Fish Habitat	<input type="checkbox"/> Primary Nursery Area
<input type="checkbox"/> Publicly owned property	<input type="checkbox"/> NCDWR riparian buffer rule in effect
<input type="checkbox"/> Anadromous fish	<input type="checkbox"/> 303(d) List
<input type="checkbox"/> Documented presence of a federal and/or state listed protected species within the assessment area.	<input type="checkbox"/> Water Supply Watershed (<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V)
<input type="checkbox"/> Nutrient Sensitive Waters	<input type="checkbox"/> High Quality Waters/Outstanding Resource Waters
<input type="checkbox"/> CAMA Area of Environmental Concern (AEC)	<input type="checkbox"/> Nutrient Sensitive Waters
List species: _____	
<input type="checkbox"/> Designated Critical Habitat (list species): _____	
19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

1. **Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)**
 - A Water throughout assessment reach.
 - B No flow, water in pools only.
 - C No water in assessment reach.

2. **Evidence of Flow Restriction – assessment reach metric**
 - A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
 - B Not A

3. **Feature Pattern – assessment reach metric**
 - A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
 - B Not A.

4. **Feature Longitudinal Profile – assessment reach metric**
 - A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
 - B Not A

5. **Signs of Active Instability – assessment reach metric**
Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).
 - A < 10% of channel unstable
 - B 10 to 25% of channel unstable
 - C > 25% of channel unstable

6. **Streamside Area Interaction – streamside area metric**
Consider for the Left Bank (LB) and the Right Bank (RB).

LB	RB	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Little or no evidence of conditions that adversely affect reference interaction
<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching])
<input type="checkbox"/> C	<input type="checkbox"/> C	Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide

7. **Water Quality Stressors – assessment reach/intertidal zone metric**

Check all that apply.

- A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- B Excessive sedimentation (burying of stream features or intertidal zone)
- C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- D Odor (not including natural sulfide odors)
- E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- F Livestock with access to stream or intertidal zone
- G Excessive algae in stream or intertidal zone
- H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- I Other: _____ (explain in "Notes/Sketch" section)
- J Little to no stressors

8. **Recent Weather – watershed metric**

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- C No drought conditions

9. **Large or Dangerous Stream – assessment reach metric**

Yes No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. **Natural In-stream Habitat Types – assessment reach metric**

10a. Yes No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|---|------------------------------------|---|
| <ul style="list-style-type: none"> <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) <input checked="" type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation <input checked="" type="checkbox"/> C Multiple snags and logs (including lap trees) <input type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter <input type="checkbox"/> E Little or no habitat | Check for Tidal Marsh Streams only | <ul style="list-style-type: none"> <input type="checkbox"/> F 5% oysters or other natural hard bottoms <input type="checkbox"/> G Submerged aquatic vegetation <input type="checkbox"/> H Low-tide refugia (pools) <input type="checkbox"/> I Sand bottom <input type="checkbox"/> J 5% vertical bank along the marsh <input type="checkbox"/> K Little or no habitat |
|---|------------------------------------|---|

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. **Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

11a. Yes No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- A Riffle-run section (evaluate 11c)
- B Pool-glide section (evaluate 11d)
- C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged. Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bedrock/saprolite
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boulder (256 – 4096 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cobble (64 – 256 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gravel (2 – 64 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sand (.062 – 2 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Silt/clay (< 0.062 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Detritus
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d. Yes No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. **Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)**

12a. Yes No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13.

No Water Other: _____

12b. Yes No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

- 1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.
- Adult frogs
 - Aquatic reptiles
 - Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats)
 - Beetles (including water pennies)
 - Caddisfly larvae (Trichoptera [T])
 - Asian clam (*Corbicula*)
 - Crustacean (isopod/amphipod/crayfish/shrimp)
 - Damselfly and dragonfly larvae
 - Dipterans (true flies)
 - Mayfly larvae (Ephemeroptera [E])
 - Megaloptera (alderfly, fishfly, dobsonfly larvae)
 - Midges/mosquito larvae
 - Mosquito fish (*Gambusia*) or mud minnows (*Umbra pygmaea*)
 - Mussels/Clams (not *Corbicula*)
 - Other fish

- Salamanders/tadpoles
- Snails
- Stonefly larvae (Plecoptera [P])
- Tipulid larvae
- Worms/leeches

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

- | | | |
|----------------------------|----------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)
Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of streamside area with depressions able to pond water ≥ 6 inches deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)
Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

- | | | |
|----------------------------|----------------------------|--|
| LB | RB | |
| <input type="checkbox"/> Y | <input type="checkbox"/> Y | Are wetlands present in the streamside area? |
| <input type="checkbox"/> N | <input type="checkbox"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)
Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- A Streams and/or springs (jurisdictional discharges)
- B Ponds (include wet detention basins; do not include sediment basins or dry detention basins)
- C Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam)
- D Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage)
- E Stream bed or bank soil reduced (dig through deposited sediment if present)
- F None of the above

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)
Check all that apply.

- A Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation)
- B Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit)
- C Urban stream (≥ 24% impervious surface for watershed)
- D Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach
- E Assessment reach relocated to valley edge
- F None of the above

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)
Consider aspect. Consider "leaf-on" condition.

- A Stream shading is appropriate for stream category (may include gaps associated with natural processes)
- B Degraded (example: scattered trees)
- C Stream shading is gone or largely absent

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)
Consider "vegetated buffer" and "wooded buffer" separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

- | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|---|
| Vegetated | | Wooded | | |
| LB | RB | LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100-feet wide or extends to the edge of the watershed |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | From 50 to < 100-feet wide |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | From 30 to < 50-feet wide |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 30-feet wide |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | < 10-feet wide or no trees |

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Vegetated" Buffer Width).

- | | | |
|----------------------------|----------------------------|---|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Mature forest |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Non-mature woody vegetation or modified vegetation structure |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Herbaceous vegetation with or without a strip of trees < 10 feet wide |
| <input type="checkbox"/> D | <input type="checkbox"/> D | Maintained shrubs |
| <input type="checkbox"/> E | <input type="checkbox"/> E | Little or no vegetation |

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)
Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

- If none of the following stressors occurs on either bank, check here and skip to Metric 22:
- | | | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--|
| Abuts | | < 30 feet | | 30-50 feet | | |
| LB | RB | LB | RB | LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Row crops |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Maintained turf |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Pasture (no livestock)/commercial horticulture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | Pasture (active livestock use) |

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)
Consider for left bank (LB) and right bank (RB) for Metric 19 ("Wooded" Buffer Width).

- | | | |
|----------------------------|----------------------------|-----------------------------|
| LB | RB | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Medium to high stem density |

- B B Low stem density
 C C No wooded riparian buffer or predominantly herbaceous species or bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

- LB RB
 A A The total length of buffer breaks is < 25 percent.
 B B The total length of buffer breaks is between 25 and 50 percent.
 C C The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

- LB RB
 A A Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
 B B Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing or communities with non-native invasive species present, but not dominant, over a large portion of the expected strata or communities missing understory but retaining canopy trees.
 C C Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent or communities with non-native invasive species dominant over a large portion of expected strata or communities composed of planted stands of non-characteristic species or communities inappropriately composed of a single species or no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. Yes No Was a conductivity measurement recorded?

If No, select one of the following reasons. No Water Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

- A <46 B 46 to < 67 C 67 to < 79 D 79 to < 230 E ≥ 230

Notes/Sketch:

Livestock have access to stream. Only herbaceous vegetation along banks. Culvert upstream is failing.

NC SAM Stream Rating Sheet
Accompanies User Manual Version 2.1

Stream Site Name Sandy Branch - UT2
 Stream Category Pa2

Date of Evaluation 6/11/19
 Assessor Name/Organization C. Lanza

Notes of Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) NO
 Additional stream information/supplementary measurements included (Y/N) YES
 NC SAM feature type (perennial, intermittent, Tidal Marsh Stream) Perennial

Function Class Rating Summary	USACE/ All Streams	NCDWR Intermittent
(1) Hydrology	LOW	
(2) Baseflow	MEDIUM	
(2) Flood Flow	LOW	
(3) Streamside Area Attenuation	MEDIUM	
(4) Floodplain Access	MEDIUM	
(4) Wooded Riparian Buffer	MEDIUM	
(4) Microtopography	LOW	
(3) Stream Stability	LOW	
(4) Channel Stability	LOW	
(4) Sediment Transport	HIGH	
(4) Stream Geomorphology	LOW	
(2) Stream/Intertidal Zone Interaction	NA	
(2) Longitudinal Tidal Flow	NA	
(2) Tidal Marsh Stream Stability	NA	
(3) Tidal Marsh Channel Stability	NA	
(3) Tidal Marsh Stream Geomorphology	NA	
(1) Water Quality	LOW	
(2) Baseflow	MEDIUM	
(2) Streamside Area Vegetation	MEDIUM	
(3) Upland Pollutant Filtration	LOW	
(3) Thermoregulation	HIGH	
(2) Indicators of Stressors	YES	
(2) Aquatic Life Tolerance	LOW	
(2) Intertidal Zone Filtration	NA	
(1) Habitat	HIGH	
(2) In-stream Habitat	MEDIUM	
(3) Baseflow	MEDIUM	
(3) Substrate	HIGH	
(3) Stream Stability	LOW	
(3) In-stream Habitat	MEDIUM	
(2) Stream-side Habitat	HIGH	
(3) Stream-side Habitat	MEDIUM	
(3) Thermoregulation	HIGH	
(2) Tidal Marsh In-stream Habitat	NA	
(3) Flow Restriction	NA	
(3) Tidal Marsh Stream Stability	NA	
(4) Tidal Marsh Channel Stability	NA	
(4) Tidal Marsh Stream Geomorphology	NA	
(3) Tidal Marsh In-stream Habitat	NA	
(2) Intertidal Zone Habitat	NA	
Overall	LOW	

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/15/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland A
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.645333, -79.387611

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

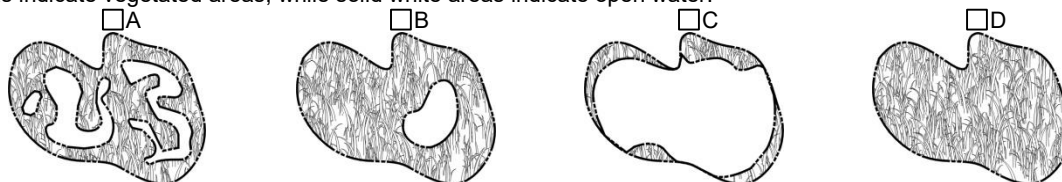
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland A Date of Assessment 1/15/19
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW	
		Condition	LOW	
Water Quality	Pathogen Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence (Y/N)	YES	
	Particulate Change	Condition	LOW	
		Condition/Opportunity	LOW	
		Opportunity Presence (Y/N)	YES	
	Soluble Change	Condition	Condition	MEDIUM
			Condition/Opportunity	HIGH
			Opportunity Presence (Y/N)	YES
		Physical Change	Condition	MEDIUM
			Condition/Opportunity	MEDIUM
			Opportunity Presence (Y/N)	YES
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	LOW	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	MEDIUM
	Condition/Opportunity	HIGH
	Opportunity Presence (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/15/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland B
Wetland Type	Floodplain Pool	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.645352, -79.387999

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input checked="" type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

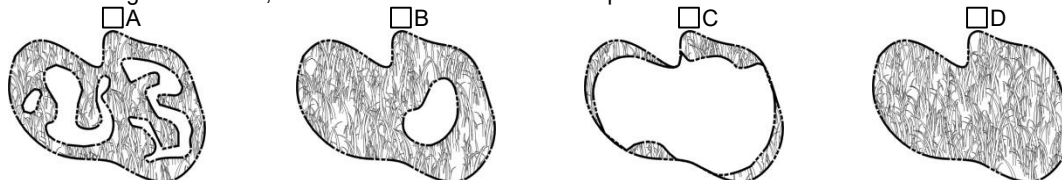
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland B Date of Assessment 1/15/19
 Wetland Type Floodplain Pool Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	MEDIUM
		Condition	NA
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	YES
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	MEDIUM
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating MEDIUM

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/15/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland C
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.645047, -79.388472

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input checked="" type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

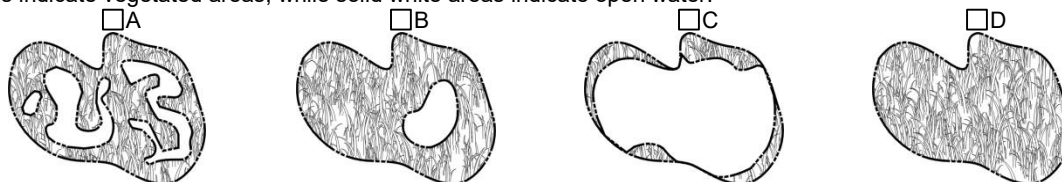
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland C Date of Assessment 1/15/19
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention	Condition	LOW	
	Sub-surface Storage and Retention	Condition	LOW	
Water Quality	Pathogen Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence (Y/N)	YES	
	Particulate Change	Condition	LOW	
		Condition/Opportunity	LOW	
		Opportunity Presence (Y/N)	YES	
	Soluble Change	Condition	Condition	MEDIUM
			Condition/Opportunity	HIGH
			Opportunity Presence (Y/N)	YES
		Physical Change	Condition	LOW
			Condition/Opportunity	LOW
			Opportunity Presence (Y/N)	YES
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	LOW	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	MEDIUM
	Opportunity Presence (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/15/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland D
Wetland Type	Floodplain Pool	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.643697, -79.387641

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

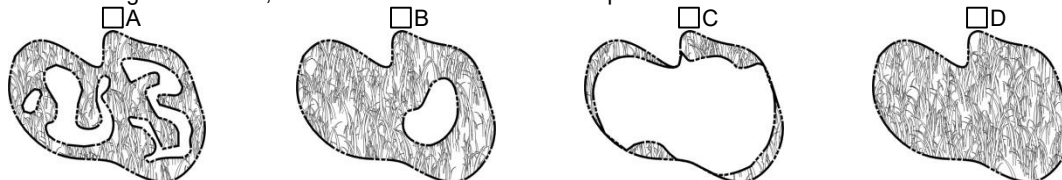
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland D Date of Assessment 1/15/19
 Wetland Type Floodplain Pool Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW
		Condition	NA
Water Quality	Pathogen Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/15/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland E
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.643211, -79.386939

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the .water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

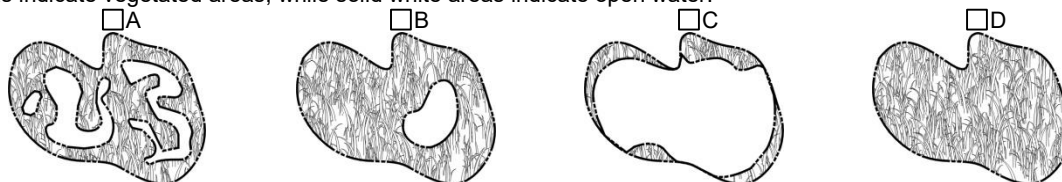
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland E Date of Assessment 1/15/19
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW
		Condition	LOW
Water Quality	Pathogen Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Soluble Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/29/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland F
Wetland Type	Floodplain Pool	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.642926, -79.387335

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland F Date of Assessment 1/29/19
 Wetland Type Floodplain Pool Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW	
		Condition	NA	
Water Quality	Pathogen Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence (Y/N)	NO	
	Particulate Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence (Y/N)	NO	
	Soluble Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence (Y/N)	NO	
	Physical Change	Physical Change	Condition	NA
			Condition/Opportunity	NA
			Opportunity Presence (Y/N)	NA
Pollution Change		Condition	NA	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	MEDIUM
	Condition/Opportunity	MEDIUM
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/29/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland G
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.643051, -79.387648

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J | <input checked="" type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input checked="" type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

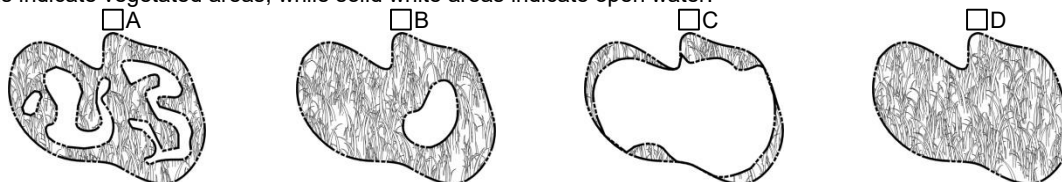
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland G Date of Assessment 1/29/19
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	LOW
		Sub-surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/29/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland H
Wetland Type	Floodplain Pool	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.642526, -79.387485

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely |
|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E < 10 acres |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

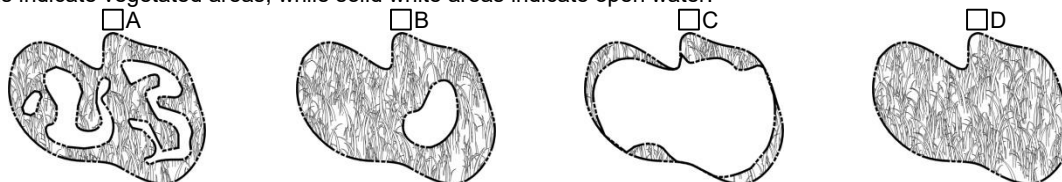
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland H Date of Assessment 1/29/19
 Wetland Type Floodplain Pool Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW
		Condition	NA
Water Quality	Pathogen Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	MEDIUM
	Condition/Opportunity	MEDIUM
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/29/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland I
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.642169, -79.387530

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input checked="" type="checkbox"/> E | < 10 acres |
| <input checked="" type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland I Date of Assessment 1/29/19
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW
		Condition	MEDIUM
Water Quality	Pathogen Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	LOW
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	3/27/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland J
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.639917, -79.387469

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input checked="" type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

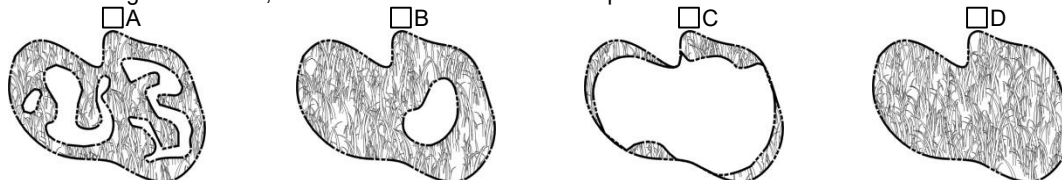
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland J Date of Assessment 3/27/19
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	LOW
		Sub-surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Soluble Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/29/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland K
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.640337, -79.386711

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric (skip for all marshes)**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric (skip for non-riparian wetlands)**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)**

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input checked="" type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

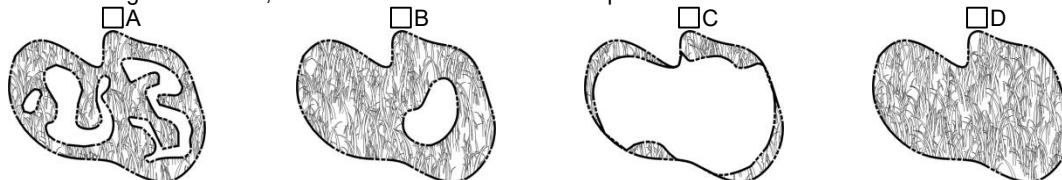
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland K Date of Assessment 1/29/19
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW
		Condition	LOW
Water Quality	Pathogen Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Particulate Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating LOW

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	1/29/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland L
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.644299, -79.386592

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input type="checkbox"/> K | <input type="checkbox"/> K | <input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input checked="" type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

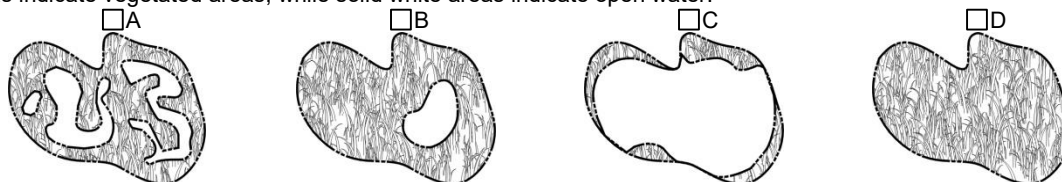
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland L Date of Assessment 1/29/19
 Wetland Type Headwater Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	MEDIUM	
		Condition	MEDIUM	
Water Quality	Pathogen Change	Condition	MEDIUM	
		Condition/Opportunity	HIGH	
		Opportunity Presence (Y/N)	YES	
	Particulate Change	Condition	HIGH	
		Condition/Opportunity	NA	
		Opportunity Presence (Y/N)	NA	
	Soluble Change	Condition	Condition	HIGH
			Condition/Opportunity	HIGH
			Opportunity Presence (Y/N)	YES
		Physical Change	Condition	MEDIUM
			Condition/Opportunity	MEDIUM
			Opportunity Presence (Y/N)	YES
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence (Y/N)	NA		
Habitat	Physical Structure	Condition	MEDIUM	
	Landscape Patch Structure	Condition	LOW	
	Vegetation Composition	Condition	LOW	

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	MEDIUM
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **MEDIUM**

NC WAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 5.0

USACE AID #		NCDWR#	
Project Name	Sandy Branch Mitigation Site	Date of Evaluation	3/27/19
Applicant/Owner Name	Wildlands Engineering	Wetland Site Name	Wetland M
Wetland Type	Headwater Forest	Assessor Name/Organization	C. Neaves/Wildlands
Level III Ecoregion	Piedmont	Nearest Named Water Body	Sandy Branch
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit	03030003
County	Chatham	NCDWR Region	Raleigh
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees)	35.640855, -79.387961

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on the last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations - Were regulatory considerations evaluated? Yes No If Yes, check all that apply to the assessment area.

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWR riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (skip for all marshes)

Check a box in each column. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric (skip for all marshes)

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the top 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
C Loamy or clayey soils not exhibiting redoximorphic features
D Loamy or clayey gleyed soil
E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric (skip for non-riparian wetlands)

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M).

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Confined animal operations (or other local, concentrated source of pollutants) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | ≥ 20% coverage of pasture |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | Little or no opportunity to improve water quality. Lack of opportunity may result from little or no disturbance in the watershed <u>or</u> hydrologic alterations that prevent drainage <u>and/or</u> overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric (skip for non-riparian wetlands)

- 7a. Is assessment area within 50 feet of a tributary or other open water?
Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? (Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of wetland. Record a note if a portion of the buffer has been removed or disturbed.)
A ≥ 50 feet
B From 30 to < 50 feet
C From 15 to < 30 feet
D From 5 to < 15 feet
E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
≤ 15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
Yes No
- 7e. Is stream or other open water sheltered or exposed?
Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex condition metric (evaluate WT for all marshes and Estuarine Woody Wetland only; evaluate WC for Bottomland Hardwood Forest, Headwater Forest, and Riverine Swamp Forest only)

Check a box in each column for riverine wetlands only. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment area (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric (skip for non-riparian wetlands)

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric (skip for non-riparian wetlands and all marshes)

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A ≥ 500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D From 25 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E From 10 to < 25 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F From 5 to < 10 acres |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G From 1 to < 5 acres |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H From 0.5 to < 1 acre |
| <input type="checkbox"/> I | <input type="checkbox"/> I | <input type="checkbox"/> I From 0.1 to < 0.5 acre |
| <input type="checkbox"/> J | <input type="checkbox"/> J | <input type="checkbox"/> J From 0.01 to < 0.1 acre |
| <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K | <input checked="" type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin type is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This metric evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, maintained fields (pasture and agriculture), or open water > 300 feet wide.

- | Well | Loosely | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 500 acres |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input checked="" type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes and Estuarine Woody Wetland)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors, and clear-cuts. Consider the eight main points of the compass. Artificial edge occurs within 150 feet in how many directions? If the assessment area is clear cut, select option "C."

- A 0
- B 1 to 4
- C 5 to 8

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition, or expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species), or exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (< 10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (> 50 % cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric (skip for all marshes)

A Large snags (more than one) are visible (> 12 inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric (skip for all marshes)

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

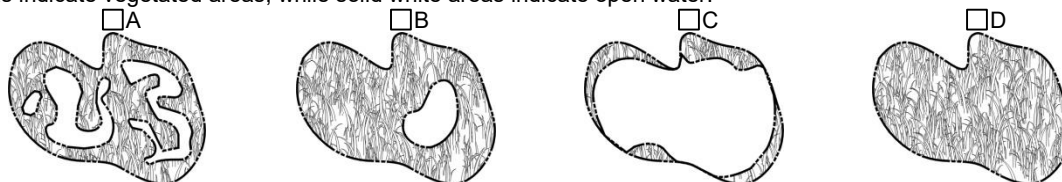
20. Large Woody Debris – wetland type condition metric (skip for all marshes)

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands and Salt/Brackish Marsh only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision. Documentation required if evaluated as B, C, or D.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

**NC WAM Wetland Rating Sheet
Accompanies User Manual Version 5.0**

Wetland Site Name Wetland M Date of Assessment 3/27/19
 Wetland Type Headwater Forest Assessor Name/Organization C. Neaves/Wildlands

Notes on Field Assessment Form (Y/N) NO
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention Sub-surface Storage and Retention	Condition	LOW
		Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	YES
	Particulate Change	Condition	LOW
		Condition/Opportunity	NA
		Opportunity Presence (Y/N)	NA
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	HIGH
		Opportunity Presence (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	LOW

Function Rating Summary

Function	Metrics	Rating
Hydrology	Condition	LOW
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating LOW

Appendix 7

Existing Stream Cross Sections


Appendix 8


Categorical Exclusion Documentation and Agency Correspondence

Appendix A

**Categorical Exclusion Form for Ecosystem Enhancement
Program Projects
Version 1.4**

Note: Only Appendix A should be submitted (along with any supporting documentation) as the environmental document.

Part 1: General Project Information	
Project Name:	Sandy Branch Mitigation Site
County Name:	Chatham County
EEP Number:	100060
Project Sponsor:	Wildlands Engineering, Inc.
Project Contact Name:	Carolyn Lanza
Project Contact Address:	312 W. Millbrook, Suite 225, Raleigh, NC 27609
Project Contact E-mail:	clanza@wildlandseng.com
EEP Project Manager:	Jeff Schaffer
Project Description	
The Sandy Branch Mitigation Site is a stream and wetland mitigation project located approximately 7 miles southeast of Siler City in Chatham County. The project includes UT Sandy Branch, two unnamed tributaries and wetland reestablishment for a total of 3,039 linear feet of stream and 7.0 acres of wetlands. Agriculture, specifically livestock, has been the main use of the land. The project will provide stream and wetland mitigation units to the Division of Mitigation Services in the Cape Fear River Basin (0303003).	
For Official Use Only	
Reviewed By:	
<u>10/1/2018</u>	
Date	EEP Project Manager
Conditional Approved By:	

Date	For Division Administrator FHWA
<input type="checkbox"/> Check this box if there are outstanding issues	
Final Approval By:	
<u>10-1-18</u>	
Date	For Division Administrator FHWA

Part 2: All Projects Regulation/Question		Response
Coastal Zone Management Act (CZMA)		
1. Is the project located in a CAMA county?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
2. Does the project involve ground-disturbing activities within a CAMA Area of Environmental Concern (AEC)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
3. Has a CAMA permit been secured?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
4. Has NCDCCM agreed that the project is consistent with the NC Coastal Management Program?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)		
1. Is this a "full-delivery" project?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
2. Has the zoning/land use of the subject property and adjacent properties ever been designated as commercial or industrial?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
3. As a result of a limited Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
4. As a result of a Phase I Site Assessment, are there known or potential hazardous waste sites within or adjacent to the project area?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
5. As a result of a Phase II Site Assessment, are there known or potential hazardous waste sites within the project area?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
6. Is there an approved hazardous mitigation plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
National Historic Preservation Act (Section 106)		
1. Are there properties listed on, or eligible for listing on, the National Register of Historic Places in the project area?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
2. Does the project affect such properties and does the SHPO/THPO concur?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
3. If the effects are adverse, have they been resolved?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)		
1. Is this a "full-delivery" project?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
2. Does the project require the acquisition of real estate?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
3. Was the property acquisition completed prior to the intent to use federal funds?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
4. Has the owner of the property been informed: * prior to making an offer that the agency does not have condemnation authority; and * what the fair market value is believed to be?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	

Part 3: Ground-Disturbing Activities Regulation/Question		Response
American Indian Religious Freedom Act (AIRFA)		
1. Is the project located in a county claimed as "territory" by the Eastern Band of Cherokee Indians?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Is the site of religious importance to American Indians?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Is the project listed on, or eligible for listing on, the National Register of Historic Places?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Have the effects of the project on this site been considered?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Antiquities Act (AA)		
1. Is the project located on Federal lands?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be loss or destruction of historic or prehistoric ruins, monuments or objects of antiquity?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Archaeological Resources Protection Act (ARPA)		
1. Is the project located on federal or Indian lands (reservation)?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Will there be a loss or destruction of archaeological resources?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Will a permit from the appropriate Federal agency be required?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Has a permit been obtained?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Endangered Species Act (ESA)		
1. Are federal Threatened and Endangered species and/or Designated Critical Habitat listed for the county?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Is Designated Critical Habitat or suitable habitat present for listed species?		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
3. Are T&E species present or is the project being conducted in Designated Critical Habitat?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Is the project "likely to adversely affect" the species and/or "likely to adversely modify" Designated Critical Habitat?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Does the USFWS/NOAA-Fisheries concur in the effects determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
6. Has the USFWS/NOAA-Fisheries rendered a "jeopardy" determination?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

Executive Order 13007 (Indian Sacred Sites)	
1. Is the project located on Federal lands that are within a county claimed as "territory" by the EBCI?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the EBCI indicated that Indian sacred sites may be impacted by the proposed project?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Have accommodations been made for access to and ceremonial use of Indian sacred sites?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Farmland Protection Policy Act (FPPA)	
1. Will real estate be acquired?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Has NRCS determined that the project contains prime, unique, statewide or locally important farmland?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
3. Has the completed Form AD-1006 been submitted to NRCS?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Fish and Wildlife Coordination Act (FWCA)	
1. Will the project impound, divert, channel deepen, or otherwise control/modify any water body?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
2. Have the USFWS and the NCWRC been consulted?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Land and Water Conservation Fund Act (Section 6(f))	
1. Will the project require the conversion of such property to a use other than public, outdoor recreation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has the NPS approved of the conversion?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat)	
1. Is the project located in an estuarine system?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Is suitable habitat present for EFH-protected species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
3. Is sufficient design information available to make a determination of the effect of the project on EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
4. Will the project adversely affect EFH?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
5. Has consultation with NOAA-Fisheries occurred?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Migratory Bird Treaty Act (MBTA)	
1. Does the USFWS have any recommendations with the project relative to the MBTA?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Have the USFWS recommendations been incorporated?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Wilderness Act	
1. Is the project in a Wilderness area?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2. Has a special use permit and/or easement been obtained from the maintaining federal agency?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

Sandy Branch Mitigation Site
Categorical Exclusion
SUMMARY

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides a Federal “Superfund” to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment.

As the Sandy Branch Mitigation Site is a full-delivery project; an EDR Radius Map Report with Geocheck was ordered for the site through Environmental Data Resources, Inc. on July 2, 2018. The EDR report identified “The Old Place”, a catering operation that uses a permitted well as their water supply, in the Federal FINDs database. While the EDR map depicts the location of “The Old Place” as within the Sandy Branch project area, the catering facility and well are actually located on a parcel outside of the Sandy Branch Site (See Figure 3). Based on the nature of the listed site and its location outside of the Sandy Branch Mitigation Site, it was determined that there is no evidence of any “recognized environmental conditions” in connection with the target property. The Executive Summary of the EDR report and the specific Site Summary for The Old Place are included in the Appendix.

National Historic Preservation Act (Section 106)

The National Historic Preservation Act declares a national policy of historic preservation to protect, rehabilitate, restore, and reuse districts, sites, buildings, structures, and objects significant in American architecture, history, archaeology, and culture, and Section 106 mandates that federal agencies take into account the effect of an undertaking on a property that is included in, or is eligible for inclusion in, the National Register of Historic Places.

Wildlands Engineering, Inc. (Wildlands) requested review and comment from the State Historic Preservation Office (SHPO) with respect to any archeological and architectural resources related to the Sandy Branch Mitigation Site on July 11, 2018. SHPO responded on August 16, 2018 and stated they were aware of “no historic resources which would be affected by the project” and would have no further comment. All correspondence related to Section 106 is included in the Appendix.

Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act)

These acts, collectively known as the Uniform Act, provide for uniform and equitable treatment of persons displaced from their homes, businesses, non-profit associations, or farms by federal and federally-assisted programs, and establish uniform and equitable land acquisition policies.

Sandy Branch Mitigation Site is a full-delivery project that includes land acquisition. Notification of the fair market value of the project property and the lack of condemnation authority by Wildlands was included in the signed Option Agreement for the project property. A copy of the relevant section of the Option Agreement is included in the Appendix.

Endangered Species Act (ESA)

Section 7 of the ESA requires federal agencies, in consultation with and with the assistance of the Secretary of the Interior or of Commerce, as appropriate, to ensure that actions they authorize, fund or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species.

The Chatham County listed endangered species includes the red-cockaded woodpecker (*Picoides borealis*), Bald Eagle (*Haliaeetus leucocephalus*), Cape Fear shiner (*Notropis mekistocholas*), and Harperella (*Ptilimnium nodosum*).

A pedestrian survey conducted on July 3, 2018, indicated that the Site did not provide suitable habitat for the red-cockaded woodpecker, Bald Eagle, Cape Fear shiner, or the harperella. Therefore, the

project has been determined by Wildlands to have "no effect" on the red-cockaded woodpecker, Bald Eagle, Cape Fear shiner, or the harperella.

Per the new standard from the United States Fish and Wildlife Service (USFWS) Raleigh Field Office, Wildlands submitted the Sandy Branch Mitigation Site Self-Certification Letter on July 9, 2018. USFWS had no comment during the thirty-day review period. All documents and correspondence submitted to the USFWS are included in the Appendix.

Farmland Protection Policy Act (FPPA)

The FPPA requires that, before taking or approving any federal action that would result in conversion of farmland, the agency must examine the effects of the action using the criteria set forth in the FPPA, and, if there are adverse effects, must consider alternatives to lessen them.

The Sandy Branch Mitigation Site includes the conversion of prime farmland. As such, Form AD-1006 has been completed and submitted to the Natural Resources Conservation Service (NRCS). The completed form and correspondence documenting its submittal is included in the Appendix.

Fish and Wildlife Coordination Act (FWCA)

The FWCA requires consultation with the USFWS and the appropriate state wildlife agency on projects that alter or modify a water body. Reports and recommendations prepared by these agencies document project effects on wildlife and identify measures that may be adopted to prevent loss or damage to wildlife resources.

The Sandy Branch Mitigation Site includes stream restoration. Wildlands requested comment on the project from the North Carolina Wildlife Resources Commission (NCWRC) on July 10, 2018. Wildlands submitted the Sandy Branch Mitigation Site Self-Certification Letter on July 9, 2018. NCWRC and USFWS had no comment during the thirty-day review period. All correspondence with the two agencies is included in the Appendix.

Migratory Bird Treaty Act (MBTA)

The MBTA makes it unlawful for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird. The indirect killing of birds by destroying their nests and eggs is covered by the MBTA, so construction in nesting areas during nesting seasons can constitute a taking.

Wildlands submitted the Sandy Branch Mitigation Site Self-Certification Letter on July 9, 2018. USFWS had no comment during the thirty-day review period. All correspondence with USFWS is included in the Appendix.

Sandy Branch

289 Elmer Rd
Bear Creek, NC 27207

Inquiry Number: 5350270.2s
July 02, 2018

The EDR Radius Map™ Report with GeoCheck®



6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
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with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

289 ELMER RD
BEAR CREEK, NC 27207

COORDINATES

Latitude (North): 35.6449890 - 35° 38' 41.96"
Longitude (West): 79.3876040 - 79° 23' 15.37"
Universal Transverse Mercator: Zone 17
UTM X (Meters): 645979.6
UTM Y (Meters): 3945571.5
Elevation: 483 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5945587 SILER CITY, NC
Version Date:	2013
Northeast Map:	5945589 SILER CITY NE, NC
Version Date:	2013
Southeast Map:	5945529 GOLDSTON, NC
Version Date:	2013
Southwest Map:	5945493 BEAR CREEK, NC
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140827, 20140619
Source:	USDA

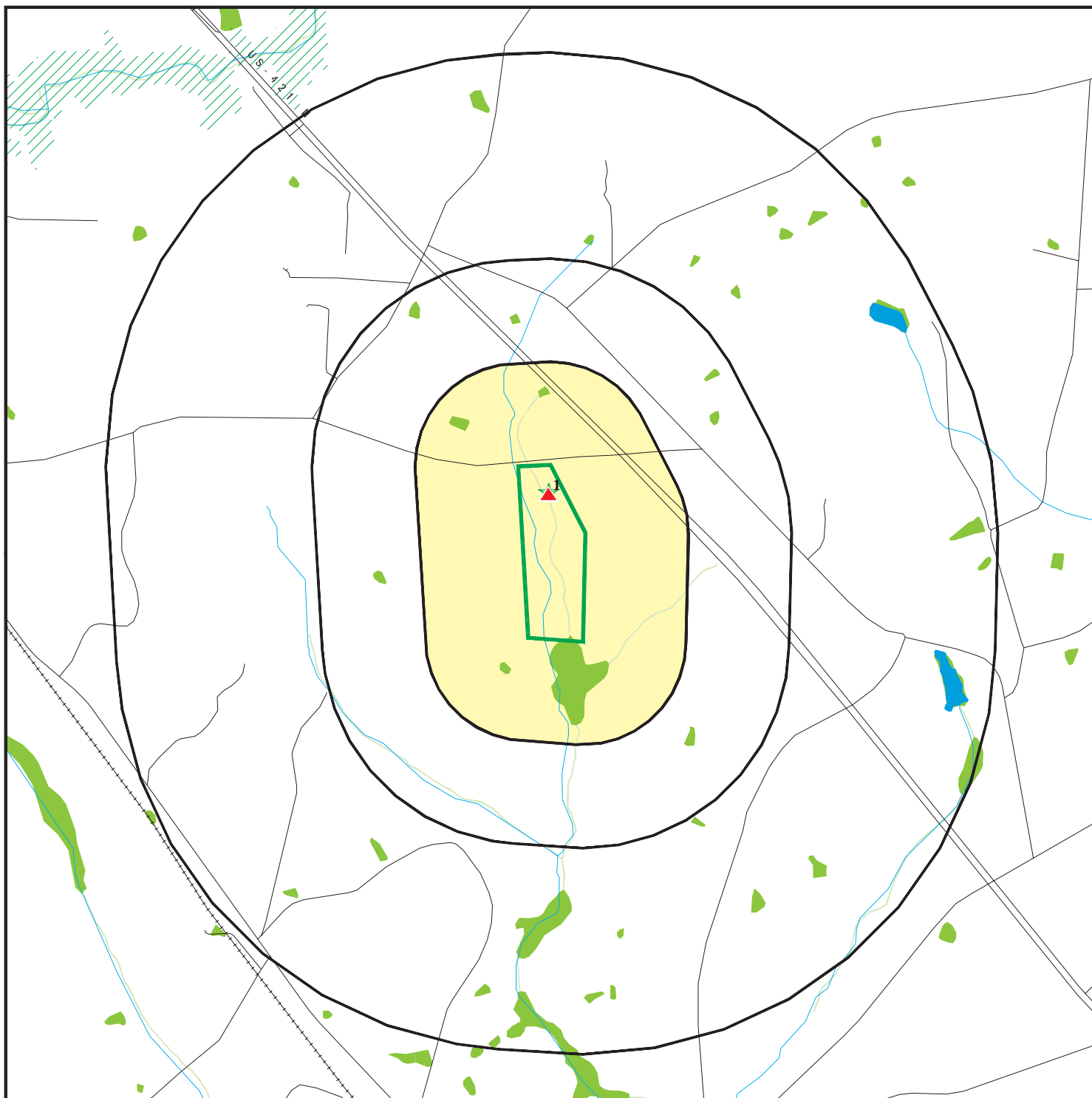
MAPPED SITES SUMMARY

Target Property Address:
289 ELMER RD
BEAR CREEK, NC 27207


Click on Map ID to see full detail.


MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	THE OLD PLACE	289 ELMER MOORE ROAD	FINDS		TP

OVERVIEW MAP - 5350270.2S



 Target Property

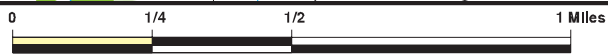
 Sites at elevations higher than or equal to the target property

 Sites at elevations lower than the target property

 Manufactured Gas Plants

 National Priority List Sites

 Dept. Defense Sites



 Indian Reservations BIA


 100-year flood zone

 500-year flood zone

 National Wetland Inventory

 State Wetlands

 Upgradient Area

 Hazardous Substance Disposal Sites

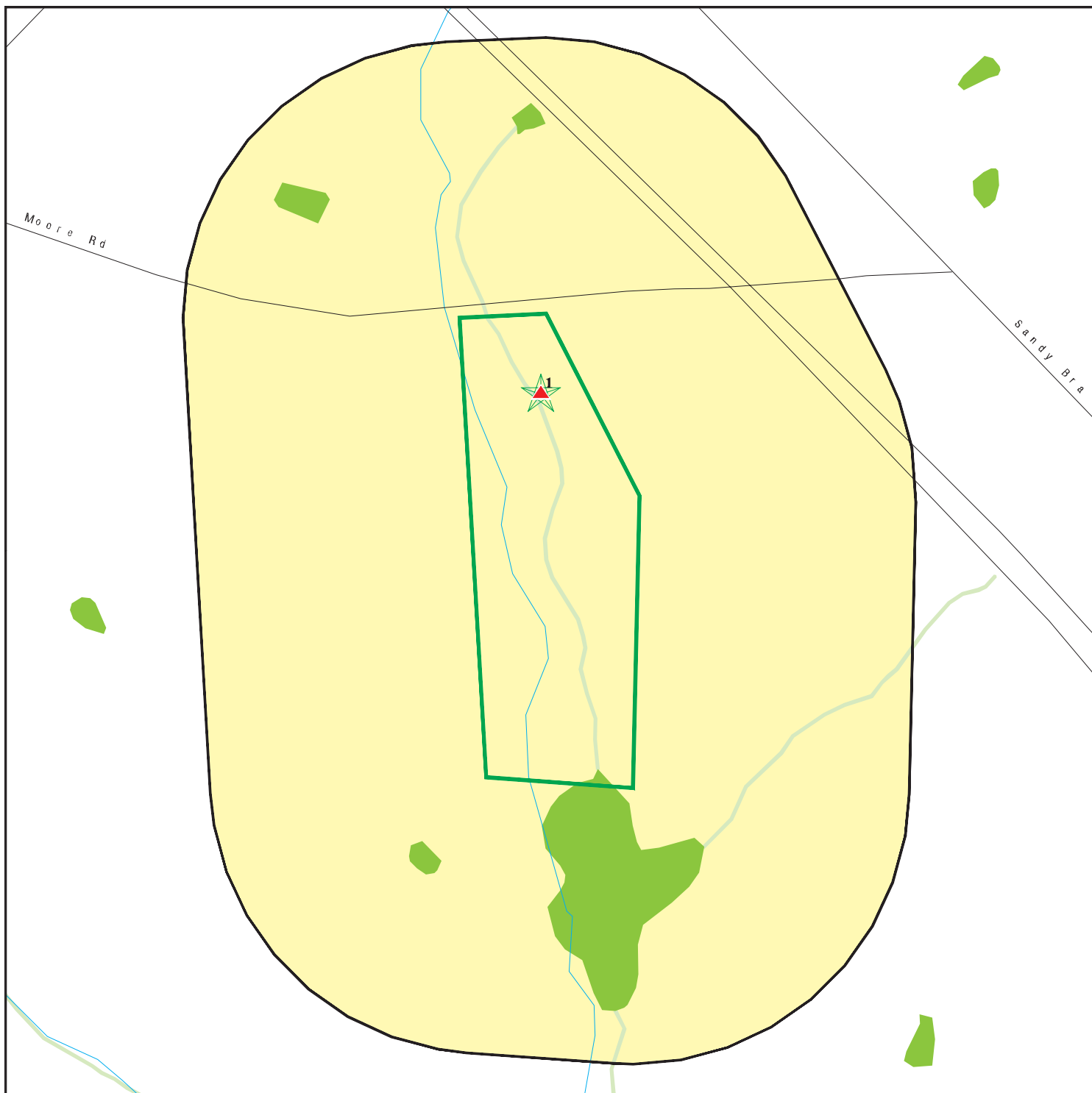













This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Sandy Branch
 ADDRESS: 289 Elmer Rd
 Bear Creek NC 27207
 LAT/LONG: 35.644989 / 79.387604

CLIENT: Wildlands Eng, Inc.
 CONTACT: Carolyn Lanza
 INQUIRY #: 5350270.2s
 DATE: July 02, 2018 1:27 pm

DETAIL MAP - 5350270.2S



-  Target Property
-  Sites at elevations higher than or equal to the target property
-  Sites at elevations lower than the target property
-  Manufactured Gas Plants
-  Sensitive Receptors
-  National Priority List Sites
-  Dept. Defense Sites
-  Indian Reservations BIA
-  National Wetland Inventory
-  State Wetlands
-  Hazardous Substance Disposal Sites



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Sandy Branch
 ADDRESS: 289 Elmer Rd
 Bear Creek NC 27207
 LAT/LONG: 35.644989 / 79.387604

CLIENT: Wildlands Eng, Inc.
 CONTACT: Carolyn Lanza
 INQUIRY #: 5350270.2s
 DATE: July 02, 2018 1:28 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
<i>Federal NPL site list</i>								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
<i>Federal Delisted NPL site list</i>								
Delisted NPL	1.000		0	0	0	0	NR	0
<i>Federal CERCLIS list</i>								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
<i>Federal CERCLIS NFRAP site list</i>								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
<i>Federal RCRA CORRACTS facilities list</i>								
CORRACTS	1.000		0	0	0	0	NR	0
<i>Federal RCRA non-CORRACTS TSD facilities list</i>								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
<i>Federal RCRA generators list</i>								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
<i>Federal institutional controls / engineering controls registries</i>								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
<i>Federal ERNS list</i>								
ERNS	0.001		0	NR	NR	NR	NR	0
<i>State- and tribal - equivalent NPL</i>								
NC HSDS	1.000		0	0	0	0	NR	0
<i>State- and tribal - equivalent CERCLIS</i>								
SHWS	1.000		0	0	0	0	NR	0
<i>State and tribal landfill and/or solid waste disposal site lists</i>								
SWF/LF	0.500		0	0	0	NR	NR	0
OLI	0.500		0	0	0	NR	NR	0
<i>State and tribal leaking storage tank lists</i>								
LAST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LUST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
<u>ADDITIONAL ENVIRONMENTAL RECORDS</u>								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
HIST LF	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
SPILLS	0.001		0	NR	NR	NR	NR	0
IMD	0.500		0	0	0	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
SPILLS 80	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.001		0	NR	NR	NR	NR	0
FINDS	0.001	1	0	NR	NR	NR	NR	1
ECHO	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
AIRS	0.001		0	NR	NR	NR	NR	0
ASBESTOS	0.001		0	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
UIC	0.001		0	NR	NR	NR	NR	0
AOP	0.001		0	NR	NR	NR	NR	0

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
<u>EDR RECOVERED GOVERNMENT ARCHIVES</u>								
<i>Exclusive Recovered Govt. Archives</i>								
RGA HWS	0.001		0	NR	NR	NR	NR	0
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		1	0	0	0	0	0	1

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID
Direction
Distance
Elevation

Site

Database(s)

EDR ID Number
EPA ID Number

1
Target
Property

THE OLD PLACE
289 ELMER MOORE ROAD
BEAR CREEK, NC 27207

FINDS **1007698621**
N/A

FINDS:

Actual:
483 ft.

Registry ID: 110018552092

Environmental Interest/Information System

NC-FITS (North Carolina - Facility Identification Template For States) is North Carolina Department of Environment and Natural Resources' (NCDENR) Facility Identification Template for States that provides a common facility identifier in order to improve accessibility to comprehensive information about environmental regulated entities in the state of North Carolina.

[Click this hyperlink](#) while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

Count: 0 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
------	--------	-----------	--------------	-----	-------------

NO SITES FOUND

THE OLD PLACE
289 ELMER MOORE ROAD
BEAR CREEK, NC 27207

Inquiry Number:
September 13, 2018

EDR Site Report™



6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

The EDR-Site Report™ is a comprehensive presentation of government filings on a facility identified in a search of federal, state and local environmental databases. The report is divided into three sections:

Section 1: Facility Summary Page 3

Summary of facility filings including a review of the following areas: waste management, waste disposal, multi-media issues, and Superfund liability.

Section 2: Facility Detail Reports Page 4

All available detailed information from databases where sites are identified.

Section 3: Databases and Update Information. Page 6

Name, source, update dates, contact phone number and description of each of the databases for this report.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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SECTION 1: FACILITY SUMMARY

FACILITY	FACILITY 1
AREA	THE OLD PLACE 289 ELMER MOORE ROAD BEAR CREEK, NC 27207 EDR ID #1007698621 EPA #110018552092
WASTE MANAGEMENT Facility generates hazardous waste (RCRA)	NO
Facility treats, stores, or disposes of hazardous waste on-site (RCRA/TSD)	NO
Facility has received Notices of Violations (RCRA/VIOL)	NO
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility is a FUSRAP Site	NO
Facility is a UXO Site	NO
Facility is a FUELS Site	NO
Facility is an DockHWC/ECHO Site	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (SEMS)	NO
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	NO
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	YES - p4
Facility is listed in other database records (OTHER)	NO
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	1

SECTION 2: FACILITY DETAIL REPORTS

MULTIMEDIA

Facility is listed in EPA's index system

DATABASE: Facility Index System (FINDS)

THE OLD PLACE
289 ELMER MOORE ROAD
BEAR CREEK, NC 27207
EDR ID #1007698621

This site is listed in the Federal FINDS database. The FINDS database may contain references to records from government databases included elsewhere in the report.
Please note: the FINDS database may also contain references to out of date records formerly associated with the site.

Registry ID: 110018552092
Facility Name: THE OLD PLACE
Facility Address: 289 ELMER MOORE ROAD
BEAR CREEK, NC 27207
HWY 421 AT ELMER MOORE RD
Facility URL: http://ofmpub.epa.gov/enviro/fii_query_detail.disp_program_facility?p_registry_id=110018552092
FIPS: 37037
Fed Facility: Not reported
Tribal Land: Not reported
Tribal Name: Not reported
Congressional District: 02
Hydrologic Unit Code: 03030003
EPA Region: 04
Site Type: STATIONARY
Date Created: 26-OCT-2004 08:18:01
Date Updated: 29-DEC-2014 09:07:54
U.S-Mexico Border: Not reported
Latitude: 35.64626
Longitude: -79.38606
Horizontal Collection: ADDRESS MATCHING-HOUSE NUMBER
Horizontal Accuracy: 30
Reference Point: CENTER OF A FACILITY OR STATION
Horizontal Datum: NAD83
Coordinates Source: Not reported
Environmental Interest/Information System
NC-FITS (North Carolina - Facility Identification Template For States) is North Carolina Department of Environment and Natural Resources' (NCDENR) Facility Identification Template for States that provides a common facility identifier in order to improve accessibility to comprehensive information about environmental regulated entities in the state of North Carolina.

Program System ID: 14856
Program Sys. Name: NC-FITS
Env. Interest Type: STATE MASTER
Env. Interest Start Dt.: Not reported
Start Date Qualifier: Not reported
Env. Interest End Dt.: Not reported
End Date Qualifier: Not reported
Data Source: NC-FITS
Active Code: Not reported

Alternative Name: THE OLD PLACE

SIC Code: 9999(NONCLASSIFIABLE ESTABLISHMENTS)

Supplemental Interest: STATE MASTER
PGM Sys ID: Not reported
Supplemental PGM Sys ID: 000319454
Start Date: 01-JUN-1998 00:00:00
Start Date Qualifier: Not reported
End Date: Not reported
End Date Qualifier: Not reported
Date Source: NC-FITS
Last Reported: Not reported
Date Created: 26-OCT-2004 08:18:01
Date Updated: Not reported

Supplemental Interest: STATE MASTER
PGM Sys ID: Not reported
Supplemental PGM Sys ID: NC0319454
Start Date: 01-JUN-1998 00:00:00
Start Date Qualifier: Not reported
End Date: Not reported
End Date Qualifier: Not reported
Date Source: NC-FITS
Last Reported: Not reported

SECTION 2: FACILITY DETAIL REPORTS

...Continued...

Date Created: 20-DEC-2006 17:31:11
Date Updated: Not reported

SECTION 3: DATABASES AND UPDATE DATES

To maintain currency of the following federal, state and local databases, EDR contacts the appropriate government agency on a monthly or quarterly basis as required.

Elapsed ASTM days: Provides confirmation that this report meets or exceeds the 90-day updating requirement of the ASTM standard.

DATABASES FOUND IN THIS REPORT

FINDS: Facility Index System/Facility Registry System

Source: EPA

Telephone: Not reported

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/21/2018
Database Release Frequency: Quarterly

Date of Last EDR Contact: 09/05/2018
Date of Next Scheduled Update: 12/17/2018



July 11, 2018

Renee Gledhill-Earley
State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

Subject: Sandy Branch Mitigation Site
Chatham County, North Carolina

Dear Ms. Gledhill-Earley,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to archaeological or cultural resources associated with the Sandy Branch Mitigation Site. A Site Map and USGS Topographic Map with approximate project areas are enclosed. The topographic figure was prepared from the Siler City 7.5-Minute USGS Topographic Quadrangle.

The Sandy Branch Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel and wetland impacts. Three unnamed tributaries and associated riparian wetlands within the Cape Fear River Basin (HUC 03030003) have been degraded due to channelization and agricultural land use. The project will include stream restoration and enhancement and wetland re-establishment and enhancement to riparian areas. There are no existing structures within the project area, and no archeological artifacts have been observed or noted during preliminary surveys of the site for restoration purposes.

We ask that you review this site based on the attached information to determine the presence of any historic properties.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning the project.

Sincerely,

A handwritten signature in cursive script that reads "Carolyn Lanza".

Carolyn Lanza
Environmental Scientist

Attachment:

Figure 1 Site Map
Figure 2 USGS Topographic Map



North Carolina Department of Natural and Cultural Resources
State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

August 16, 2018

Carolyn Lanza
Wildlands Engineering
312 West Millbrook Road, Suite 225
Raleigh, NC 27609

Re: Sandy Branch Mitigation Site, Chatham County, ER 18-1616

Dear Ms. Lanza:

Thank you for your letter of July 11, 2018, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

A handwritten signature in blue ink that reads "Renee Gledhill-Earley".

for Ramona M. Bartos

TO OPTIONEE: Wildlands Engineering, Inc.
1430 S. Mint Street, Suite 104
Charlotte, North Carolina 28203
Attention: Robert W. Bugg
eMail: rbugg@wildlandseng.com

TO OPTIONOR: Lu Anne Moore and Todd Stephen Moore
491 Elmer Moore Road
Bear Creek, NC 27207

Notice of change of address shall be given by written notice in the manner described in this Paragraph.

3.3 Assignment. Optionee shall have the right to assign this Agreement without the consent of Optionor. No assignment shall be effective, however, unless the assignee has delivered to Optionor a written assumption of Optionee's obligations under this Agreement. Optionor hereby releases Optionee from any obligations under this Agreement arising after the effective date of any assignment of this Agreement by Optionee.

3.4 Binding Effect. The terms and conditions of this Agreement shall apply and bind the heirs, executors, administrators, successors, and assigns of the Optionor and Holder.

3.5 Value of Conservation Easement; No Power of Eminent Domain. in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Optionee hereby notifies Optionor that: (i) Optionee believes that the fair market value of the Conservation Easement is an amount equal to the Purchase Price; and (ii) Optionee does not have the power of eminent domain.

3.6 Waivers. No waiver of any breach of any covenant or provision herein contained shall be deemed a waiver of any preceding or succeeding breach thereof, or of any other covenant or provision herein contained.

3.7 Survival of Obligations. Notwithstanding any provision of this Agreement, the covenants, representations, warranties, hold harmless, defense and indemnification obligations made by each party herein shall survive the Closing.

3.8 Successors and Assigns. This Agreement shall be binding upon and shall inure to the benefit of the successors and assigns of the parties hereto.

3.9 Attorneys' Fees. If either party commences an action against the other to interpret or enforce any of the terms of this Agreement or because of the breach by the other party of any of the terms hereof, the losing party shall pay to the prevailing party reasonable attorneys' fees, costs and expenses and court costs and other costs of action incurred in connection with the prosecution or defense of such action, whether or not the action is prosecuted to a final judgment.

3.10 Entire Agreement. This Agreement (including all exhibits attached hereto) is the final expression of, and contains the entire agreement between, the parties with respect to the subject matter hereof and supersedes all prior understandings with respect thereto. This Agreement may not be modified, changed, supplemented, superseded, canceled or terminated, nor may any obligations hereunder be waived, except by written instrument signed by the party to be charged or by its agent duly authorized in writing or as otherwise expressly permitted herein. Notwithstanding any rule or maxim of construction to the contrary, any ambiguity

Optionor 

Optionee 

Optionor 



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

Date: 7/9/2018

Self-Certification Letter

Project Name Sandy Branch Mitigation Site

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Raleigh Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. Based on your analysis, mark all the determinations that apply:

- “no effect” determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- “may affect, not likely to adversely affect” determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- “may affect, likely to adversely affect” determination for the Northern long-eared bat (*Myotis septentrionalis*) and relying on the findings of the January 5, 2016, Programmatic Biological Opinion for the Final 4(d) Rule on the Northern long-eared bat;
- “no Eagle Act permit required” determinations for eagles.

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the “no effect” or “not likely to adversely affect” determinations for proposed and listed species and proposed and designated critical habitat; the “may affect” determination for Northern long-eared bat; and/or the “no Eagle Act permit required” determinations for eagles. Additional coordination with this office is not needed. Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species. Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for 1 year. Information about the online project review process including instructions, species information, and other information regarding project reviews within North Carolina is available at our website <http://www.fws.gov/raleigh/pp.html>. If you have any questions, you can write to us at Raleigh@fws.gov or please contact Leigh Mann of this office at 919-856-4520, ext. 10.

Sincerely,

/s/Pete Benjamin

Pete Benjamin
Field Supervisor
Raleigh Ecological Services

Enclosures - project review package

Species Conclusions Table

Project Name: Sandy Branch Mitigation Site

Date: 7/9/2018

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Critical Habitat	No critical habitat present	No effect	
Cape Fear Shiner	No suitable habitat present	No effect	Survey conducted by qualified surveyor on July 3, 2018 indicated no potential habitat present.
Harperella	No suitable habitat present	No effect	Habitat assessment indicated no potential habitat present
Bald Eagle	Unlikely to disturb nesting bald eagles	No Eagle Act Permit Required	Habitat assessment indicated no bald eagle nest and no potential habitat present
Red-Cockaded Woodpecker	No suitable habitat present	No effect	Habitat assessment indicated no potential habitat present

Acknowledgement: I agree that the above information about my proposed project is true. I used all of the provided resources to make an informed decision about impacts in the immediate and surrounding areas.

Carolyn Lanza Environmental Scientist

Signature /Title

7/9/2018

Date



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To:
Consultation Code: 04EN2000-2018-SLI-1028
Event Code: 04EN2000-2018-E-02099
Project Name: Sandy Branch Mitigation Site

July 09, 2018

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The species list generated pursuant to the information you provided identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Section 7 of the Act requires that all federal agencies (or their designated non-federal representative), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species. A biological assessment or evaluation may be prepared to fulfill that requirement and in determining whether additional consultation with the Service is necessary. In addition to the federally-protected species list, information on the species' life histories and habitats and information on completing a biological assessment or

evaluation and can be found on our web page at <http://www.fws.gov/raleigh>. Please check the web site often for updated information or changes

If your project contains suitable habitat for any of the federally-listed species known to be present within the county where your project occurs, the proposed action has the potential to adversely affect those species. As such, we recommend that surveys be conducted to determine the species' presence or absence within the project area. The use of North Carolina Natural Heritage program data should not be substituted for actual field surveys.

If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect) a federally-protected species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on federally listed species, then you are not required to contact our office for concurrence (unless an Environmental Impact Statement is prepared). However, you should maintain a complete record of the assessment, including steps leading to your determination of effect, the qualified personnel conducting the assessment, habitat conditions, site photographs, and any other related articles.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

Not all Threatened and Endangered Species that occur in North Carolina are subject to section 7 consultation with the U.S Fish and Wildlife Service. Atlantic and shortnose sturgeon, sea turtles, when in the water, and certain marine mammals are under purview of the National Marine Fisheries Service. If your project occurs in marine, estuarine, or coastal river systems you should also contact the National Marine Fisheries Service, <http://www.nmfs.noaa.gov/>

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office. If you have any questions or comments, please contact John Ellis of this office at john_ellis@fws.gov.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Raleigh Ecological Services Field Office

Post Office Box 33726

Raleigh, NC 27636-3726

(919) 856-4520

Project Summary

Consultation Code: 04EN2000-2018-SLI-1028

Event Code: 04EN2000-2018-E-02099

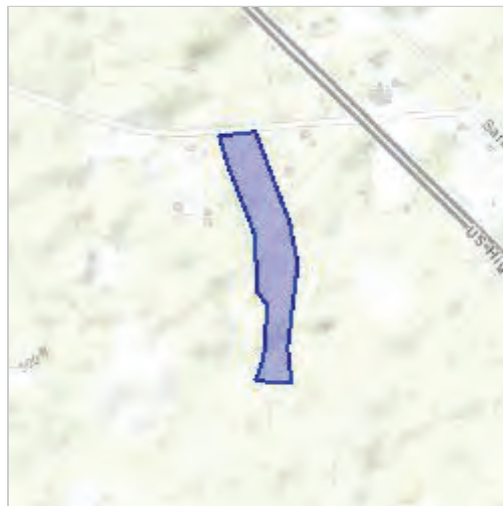
Project Name: Sandy Branch Mitigation Site

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: A 16.3 acre stream and wetland mitigation project on an active cattle farm.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/35.642926805603N79.38710300118936W>



Counties: Chatham, NC

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Red-cockaded Woodpecker <i>Picoides borealis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614	Endangered

Fishes

NAME	STATUS
Cape Fear Shiner <i>Notropis mekistocholas</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6063	Endangered

Flowering Plants

NAME	STATUS
Harperella <i>Ptilimnium nodosum</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3739	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

From: Raleigh, FW4
To: [Carolyn Lanza](#)
Subject: Confirmation of Project Receipt Re: [EXTERNAL] Online Project Review Certification Letter - Sandy Branch Mitigation Site
Date: Monday, July 9, 2018 2:13:20 PM

Thank you for submitting your online project package. We will review your package within 30 days of receipt. If you have submitted an online **project review request letter**, expect our response within 30 days. If you have submitted an online **project review certification letter**, you will typically not receive a response from us since the certification letter is our official response. However, if we have additional questions or we do not concur with your determinations, we will contact you during the review period.

FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)	Date Of Land Evaluation Request <i>7/2/18</i>
Name Of Project <i>Sandy Branch Mitigation Site</i>	Federal Agency Involved <i>NC Division of Mitigation Services</i>
Proposed Land Use <i>Stream and Wetland Restoration</i>	County And State <i>Chatham, NC</i>

PART II (To be completed by NRCS)		Date Request Received By NRCS <i>7/24/18</i>	
Does the site contain prime, unique, statewide or local important farmland? <i>(If no, the FPPA does not apply -- do not complete additional parts of this form).</i>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
		Acres Irrigated <i>-none-</i>	Average Farm Size <i>98 acres</i>
Major Crop(s) <i>CORN</i>	Farmable Land In Govt. Jurisdiction Acres: <i>393,160 acres</i> % <i>87</i>	Amount Of Farmland As Defined in FPPA Acres: <i>273,967 acres</i> % <i>60</i>	
Name Of Land Evaluation System Used <i>Chatham Co NC LESA</i>	Name Of Local Site Assessment System <i>N/A</i>	Date Land Evaluation Returned By NRCS <i>7/25/18</i>	

PART III (To be completed by Federal Agency)	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	16.34			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	16.34	0.0	0.0	0.0

PART IV (To be completed by NRCS) Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0.37			
B. Total Acres Statewide And Local Important Farmland	15.97			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.0060			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	34.2			

PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value Of Farmland To Be Converted <i>(Scale of 0 to 100 Points)</i>	87	0	0	0
---	----	---	---	---

PART VI (To be completed by Federal Agency) Site Assessment Criteria <i>(These criteria are explained in 7 CFR 658.5(b))</i>	Maximum Points				
1. Area In Nonurban Use	15	15			
2. Perimeter In Nonurban Use	10	10			
3. Percent Of Site Being Farmed	20	20			
4. Protection Provided By State And Local Government	20	20			
5. Distance From Urban Builtup Area	15	10			
6. Distance To Urban Support Services	15	0			
7. Size Of Present Farm Unit Compared To Average	10	5			
8. Creation Of Nonfarmable Farmland	10	10			
9. Availability Of Farm Support Services	5	0			
10. On-Farm Investments	20	0			
11. Effects Of Conversion On Farm Support Services	10				
12. Compatibility With Existing Agricultural Use	10				
TOTAL SITE ASSESSMENT POINTS	160	90	0	0	0

PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland <i>(From Part V)</i>	100	87	0	0	0
Total Site Assessment <i>(From Part VI above or a local site assessment)</i>	160	90	0	0	0
TOTAL POINTS (Total of above 2 lines)	260	177	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes <input type="checkbox"/> No <input type="checkbox"/>
----------------	-------------------	---

Reason For Selection:

From: [Carolyn Lanza](#)
To: ["Cortes, Milton - NRCS, Raleigh, NC"](#)
Subject: RE: Request for AD1006 Form - Sandy Branch Mitigation Site - Chatham County, NC
Date: Tuesday, September 4, 2018 8:07:00 AM
Attachments: [SandyBranch AD-1006 \(003\).pdf](#)
[image001.png](#)

Milton,

I have attached the completed Farmland Conversion Impact Rating for Sandy Branch Mitigation Site.

Hope you had a great holiday,

Carolyn Lanza | *Environmental Scientist*
O: 919.851.9986 x113 **M:** 313.969.7318

Wildlands Engineering, Inc.

312 West Millbrook Road, Suite 225
Raleigh, NC 27609

From: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>
Sent: Wednesday, July 25, 2018 3:50 PM
To: Carolyn Lanza <clanza@wildlandseng.com>
Subject: RE: Request for AD1006 Form - Sandy Branch Mitigation Site - Chatham County, NC
Importance: High

Carolyn:

Please find attached the Farmland Conversion Impact Rating evaluation for the Sandy Branch Mitigation Site - Chatham County, NC

If we can be of further assistance please let us know.

Best Regards

Milton Cortes
Acting State Soil Scientist
Natural Resources Conservation Service
4407 Bland Rd, Suite 117
Raleigh, NC 27609
Phone: 919-873-2171
milton.cortes@nc.usda.gov



From: Carolyn Lanza [<mailto:clanza@wildlandseng.com>]
Sent: Tuesday, July 24, 2018 4:38 PM
To: Cortes, Milton - NRCS, Raleigh, NC <Milton.Cortes@nc.usda.gov>

Subject: Request for AD1006 Form - Sandy Branch Mitigation Site - Chatham County, NC

Milton,

I have a request for a completed AD-1006 form for a NCDENR Division of Mitigation Services (DMS) stream restoration project (Sandy Branch Mitigation Site) located in Chatham County. Please find a Soils Map attached in addition to the AD-1006 form with Parts I and III filled out. The soil breakdown is included on the Soils Map.

Thank you for your assistance and please let me know if you need any additional information.

Carolyn Lanza | *Environmental Scientist*
O: 919.851.9986 x113 **M:** 313.969.7318

[Wildlands Engineering, Inc.](#)

312 West Millbrook Road, Suite 225
Raleigh, NC 27609

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July 10, 2018

Shannon Deaton
North Carolina Wildlife Resource Commission
Division of Inland Fisheries
1721 Mail Service Center
Raleigh, NC 27699

Subject: Sandy Branch Mitigation Site
Chatham County, North Carolina

Dear Ms. Deaton,

Wildlands Engineering, Inc. requests review and comment on any possible issues that might emerge with respect to fish and wildlife issues associated with the proposed Sandy Branch Mitigation Site. A USGS Topographic Map and an Overview Site Map showing the approximate project area are enclosed. The topographic figure was prepared from the Siler City 7.5-Minute USGS Topographic Quadrangle.

The Sandy Branch Mitigation Site is being developed to provide in-kind mitigation for unavoidable stream channel and wetland impacts. Three unnamed tributaries and associated riparian wetlands within the Cape Fear River Basin (HUC 03030003) have been degraded due to channelization and agricultural land use. The project will include stream restoration and enhancement and wetland re-establishment and enhancement to riparian areas.

We thank you in advance for your timely response and cooperation. Please feel free to contact us with any questions that you may have concerning this project.

Sincerely,

A handwritten signature in cursive script that reads "Carolyn Lanza".

Carolyn Lanza
Environmental Scientist

Attachment:
Figure 1 Site Map
Figure 2 USGS Topographic Map



Sandy Branch Mitigation Site
Categorical Exclusion

FIGURES

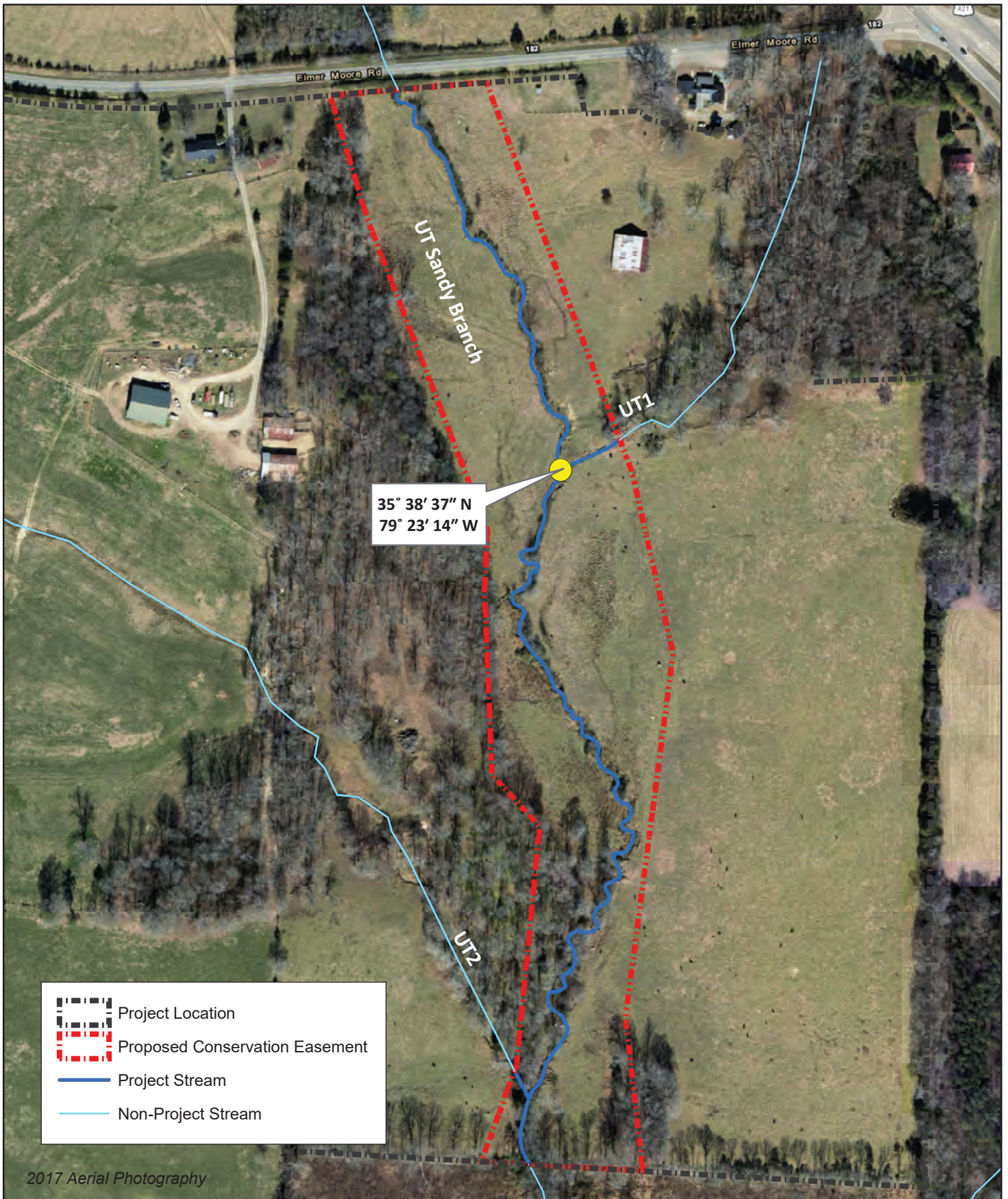


Figure 1 - Site Map
 Sandy Branch Mitigation Site
 Cape Fear River Basin (03030003)

Chatham County, NC

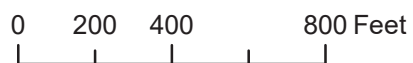
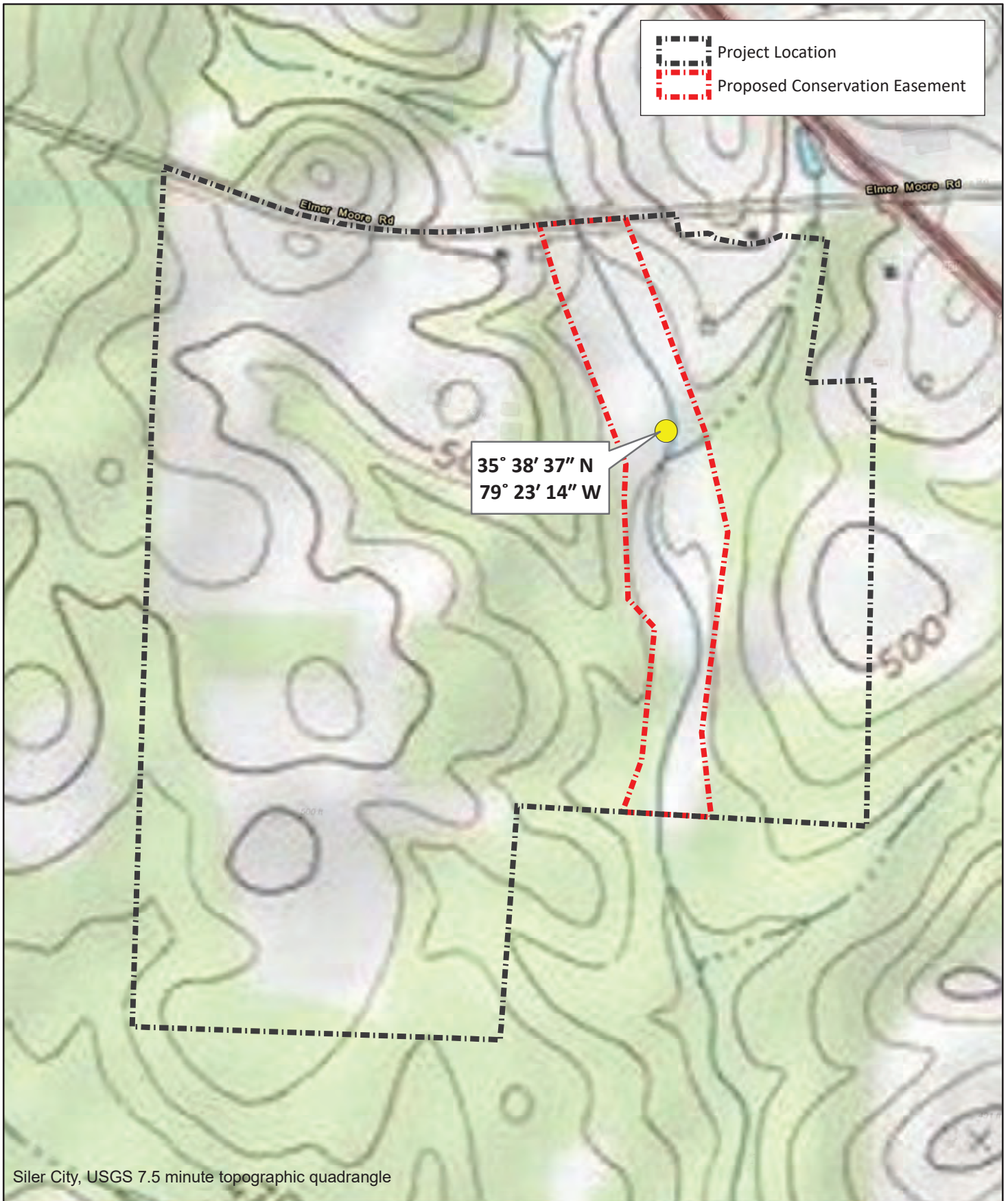
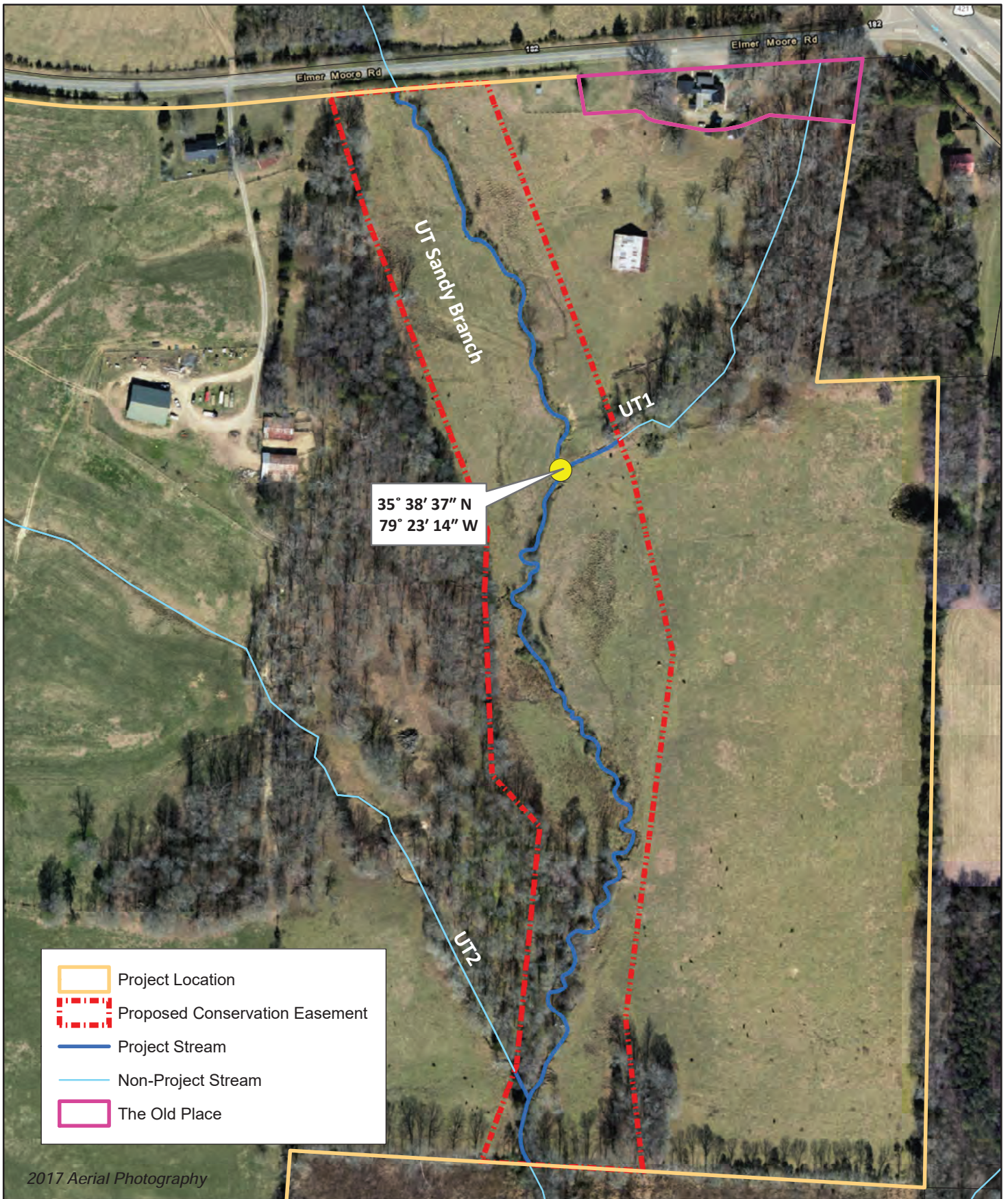


Figure 2 - USGS Topographic Map
Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)



0 300 Feet



Figure 3 - Property Boundaries
Map Sandy Branch Mitigation Site
Cape Fear River Basin (03030003)

Appendix 9

Existing, Reference, and Proposed Geomorphic Parameters

Parameter	Notation	Units	Sandy Branch Reach 1		Sandy Branch Reach 2		UT1		UT2	
			Min	Max	Min	Max	Min	Max	Min	Max
Stream Type	-		E4/F4		F4		E4/F4		F4	
Drainage Area	DA	sq mi	0.51		0.61	0.72	0.054		0.11	
Bankfull Cross-Sectional Area	A _{bkf}	SF	6.6		9.1	14	2.1		4.1	
Average Velocity During Bankfull Event	V _{bkf}	fps	3.4		2.6	3.5	3.8		3.7	
Cross Section										
Width at Bankfull	w _{bkf}	feet	6.6		7.3	11	3.3		2.9	
Maximum Depth at Bankfull	d _{max}	feet	1.6		1.7	2.1	1.2		1.7	
Mean Depth at Bankfull	d _{bkf}	feet	1.0		1.2	1.6	0.63		1.4	
Bankfull Width-to-Depth Ratio	w _{bkf} /d _{bkf}	-	6.5		4.7	8.4	5.2		2.1	
Low Bank Height		feet	1.6		3.5	4.7	3.4		4.2	
Bank Height Ratio	BHR	-	1.0		1.8	2.4	2.9		2.5	
Floodprone Area Width	w _{fpa}	feet	> 60		11	40	12		6.3	
Entrenchment Ratio	ER	-	> 9.1		1.5	3.7	3.7		2.2	
Max Pool Depth at Bankfull	d _{pool}	feet	-		1.9	2.6	-		-	
Pool Depth Ratio	d _{pool} /d _{bkf}	-	-		1.6	1.7	-		-	
Pool Width at Bankfull	w _{pool}	feet	-		8.7	12	-		-	
Pool Width Ratio	w _{pool} /w _{bkf}	-	-		1.0	1.6	-		-	
Bankfull Pool Cross-Sectional Area	A _{pool}	SF	-		12	26	-		-	
Pool Area Ratio	A _{pool} /A _{bkf}	-	-		1.3	2.4	-		-	
Pool-to-Pool Spacing	L _{p-p}	feet	22	170	20	170	NA ¹		16	48
Pool-to-Pool Spacing Ratio	L _{p-p} /w _{bkf}	-	3.5	27	2.7	23	NA ¹		5.5	17
Slope										
Valley Slope	S _{valley}	feet/ foot	0.011		0.012		0.016		0.0084	
Channel Slope	S _{channel}	feet/ foot	0.010	0.014	0.0041	0.0090	0.027		0.0084	0.014
Profile										
Sinuosity	K	-	1.1		1.2		1.1		1.1	
Belt Width	w _{bit}	feet	13	36	16	65	8.8	13	12	22
Meander Width Ratio	w _{bit} /w _{bkf}	-	2.1	5.8	2.2	8.9	2.7	4.0	4.1	7.7
Meander Length	L _m	feet	28	120	44	140	32	37	24	49
Meander Length Ratio	L _m /w _{bkf}	-	4.6	19	6.0	19	9.6	11	8.3	17
Linear Wavelength	LW	-	28	83	32	120	26	34	27	42
Linear Wavelength Ratio	LW/w _{bkf}	-	4.5	13	4.4	16	8.0	10	9.2	15
Radius of Curvature	R _c	feet	11	83	8.5	460	14	85	11	77
Radius of Curvature Ratio	R _c /w _{bkf}	-	1.8	13	1.2	63	4.1	26	3.8	27

1. The project reach of UT1 has only one pool.

Parameter	Notation	Units	Sandy Branch Reaches 1 and 2, UT2							
			Long Branch		UT to Cane Creek		Spencer Creek 2		Foust Creek	
			Min	Max	Min	Max	Min	Max	Min	Max
Stream Type	-		C4/E4		C4/E4		E4		C4	
Drainage Area	DA	sq mi	1.5		0.28		0.96		1.4	
Bankfull Discharge	Q_{bkf}	cfs	100	120	21	53	97		88	95
Bankfull Cross-Sectional Area	A_{bkf}	SF	25	35	8.5	11	18	20	24	
Average Velocity During Bankfull Event	v_{bkf}	fps	3.6	4.0	2.4	5.0	4.9	5.4	2.9	3.7
Cross Section										
Width at Bankfull	w_{bkf}	ft	15	19	8.2	12	11		19	
Maximum Depth at Bankfull	d_{max}	ft	1.9	2.9	1.5	1.7	2.1	2.6	1.8	2.1
Mean Depth at Bankfull	d_{bkf}	ft	1.3	2.1	0.90	1.0	1.6	1.8	1.2	1.3
Bankfull Width-to-Depth Ratio	w_{bkf}/d_{bkf}	-	7.9	14	7.9	13	5.8	7.1	14	16
Depth Ratio	d_{max}/d_{bkf}	-	1.4	1.5	1.7		1.3	1.4	1.4	1.7
Bank Height Ratio	BHR	-	1.2	1.5	1.0		1.0		1.0	
Floodprone Area Width	w_{fpa}	ft	> 50		> 40		60	> 110	55	100
Entrenchment Ratio	ER	-	> 3.4		> 4.6		5.5	> 10	2.9	5.3
Slope										
Valley Slope	S_{valley}	ft/ft	0.0060		0.0057		0.011		0.0095	
Channel Slope	$S_{channel}$	ft/ft	0.0040		0.0046		0.0047		0.0090	
Profile										
Riffle Slope	S_{riffle}	ft/ft	0.013	0.012	0.012		0.013		-	
Riffle Slope Ratio	$S_{riffle}/S_{channel}$	-	3.3	3.0	2.6		2.8		-	
Pool Slope	S_{pool}	ft/ft	0.00030	0.0030	0.0010		0.00070	0.00090	-	
Pool Slope Ratio	$S_{pool}/S_{channel}$	-	0.10	0.80	0.30		0.15	0.19	-	
Pool-to-Pool Spacing	L_{p-p}	ft	50	110	1.6	95	71		-	
Pool Spacing Ratio	L_{p-p}/w_{bkf}	-	3.4	7.1	0.10	8.6	6.3	6.6	-	
Pool Cross-Sectional Area at Bankfull	A_{pool}	SF	26	33	13		25		29	35
Pool Area Ratio	A_{pool}/A_{bkf}	-	1.0	1.3	1.5		1.2	1.4	1.2	1.5
Maximum Pool Depth at Bankfull	d_{pool}	ft	2.2		2.6		3.3		2.5	2.9
Pool Depth Ratio	d_{pool}/d_{bkf}	-	0.80	1.2	1.7		1.8	2.0	1.9	2.3
Pool Width at Bankfull	w_{pool}	ft	16	19	12		18		15	21
Pool Width Ratio	w_{pool}/w_{bkf}	-	0.90	1.3	1.5		1.6		0.80	1.1
Pattern										
Sinuosity	K	-	1.3		1.2		2.3		1.1	
Belt Width	w_{blt}	ft	60		50	77	38	41	-	
Meander Width Ratio	w_{blt}/w_{bkf}	-	3.2	4.1	4.2	9.4	3.4	3.6	-	
Linear Wavelength	LW	ft	66	190	29	96	46	48	-	
Linear Wavelength Ratio	LW/w_{bkf}	-	4.5	10	2.6	8.7	4.1	4.4	-	
Meander Length	L_m	ft	-		-		-		-	
Meander Length Ratio	L_m/w_{bkf}	-	-		-		-		-	
Radius of Curvature	R_c	ft	16	87	11	27	11	15	-	
Radius of Curvature Ratio	R_c/w_{bkf}	-	1.1	4.7	1.0	2.5	1.3	1.4	-	
Sediment										
d_{50} Description			-		-		Medium Gravel		Very Coarse Gravel	
Reach Wide	d_{16}	mm	-		-		< 0.062		9.6	
	d_{35}	mm	-		-		3.0		37	
	d_{50}	mm	42		-		8.8		61	
	d_{84}	mm	-		-		42		130	
	d_{95}	mm	-		-		90		1100	

Parameter	Notation	Units	UT1							
			Spencer Creek 3		UT to Cane Creek		UT to Varnals Creek		UT to Wells Creek	
			Min	Max	Min	Max	Min	Max	Min	Max
Stream Type	-		E4		C4/E4		E4		C4/C1	
Drainage Area	DA	sq mi	0.37		0.28		0.41		0.13	
Bankfull Discharge	Q_{bkf}	cfs	35		21	53	54		15	
Bankfull Cross-Sectional Area	A_{bkf}	SF	6.6	8.7	8.5	11	10	12	3.9	6.3
Average Velocity During Bankfull Event	v_{bkf}	fps	5.0	5.6	2.4	5.0	4.4	5.2	2.4	3.8
Cross Section										
Width at Bankfull	w_{bkf}	ft	6.3	9.3	8.2	12	9.3	11	6.2	8.6
Maximum Depth at Bankfull	d_{max}	ft	1.0	1.2	1.5	1.7	1.5	1.7	0.64	1.4
Mean Depth at Bankfull	d_{bkf}	ft	0.80	1.0	0.90	1.0	1.1	1.2	0.56	1.0
Bankfull Width-to-Depth Ratio	w_{bkf}/d_{bkf}	-	7.9	9.3	7.9	13	8.1	9.3	6.1	13
Depth Ratio	d_{max}/d_{bkf}	-	1.2	1.3	1.7	1.7	1.4	1.4	0.81	1.8
Bank Height Ratio	BHR	-	1.0		1.0		1.0		1.0	1.8
Floodprone Area Width	w_{fpa}	ft	14	130	> 40		20	64	15	25
Entrenchment Ratio	ER	-	1.7	4.3	> 4.6		1.9	6.1	1.9	4.1
Slope										
Valley Slope	S_{valley}	ft/ft	0.022	0.031	0.0057		0.020		0.028	
Channel Slope	$S_{channel}$	ft/ft	0.019	0.022	0.0046		0.017		0.020	
Profile										
Riffle Slope	S_{riffle}	ft/ft	0.018	0.034	0.012		0.024	0.057	0.016	0.085
Riffle Slope Ratio	$S_{riffle}/S_{channel}$	-	1.0	1.6	2.6		1.4	3.4	0.82	4.3
Pool Slope	S_{pool}	ft/ft	0.00070	0.014	0.0010		0.000	0.015	0.000	0.0085
Pool Slope Ratio	$S_{pool}/S_{channel}$	-	0.00	0.60	0.30		0.00	0.88	0.00	0.43
Pool-to-Pool Spacing	L_{p-p}	ft	9.0	46	1.6	95	7.8	82	17	63
Pool Spacing Ratio	L_{p-p}/w_{bkf}	-	1.4	4.9	0.10	8.6	0.50	5.6	2.3	8.8
Pool Cross-Sectional Area at Bankfull	A_{pool}	SF	6.5	9.8	13		22	23	6.2	9.0
Pool Area Ratio	A_{pool}/A_{bkf}	-	1.0	1.1	1.5		1.8	1.9	1.2	1.7
Maximum Pool Depth at Bankfull	d_{pool}	ft	1.2	1.8	2.6		2.5	2.6	-	
Pool Depth Ratio	d_{pool}/d_{bkf}	-	1.5	1.8	1.7		3.0	3.1	-	
Pool Width at Bankfull	w_{pool}	ft	6.0	12	12		15	19	7.1	10
Pool Width Ratio	w_{pool}/w_{bkf}	-	1.0	1.3	1.5		1.0	1.3	1.0	1.5
Pattern										
Sinuosity	K	-	1.0	1.3	1.2		1.2		1.4	
Belt Width	w_{blt}	ft	10	50	50	77	15	45	10	35
Meander Width Ratio	w_{blt}/w_{bkf}	-	1.6	5.4	4.2	9.4	1.0	3.0	1.4	4.9
Linear Wavelength	LW	ft	55	140	29	96	16	47	35	70
Linear Wavelength Ratio	LW/w_{bkf}	-	8.7	15	2.6	8.7	1.1	3.2	4.9	9.8
Meander Length	L_m	ft	53	180	-		-		-	
Meander Length Ratio	L_m/w_{bkf}	-	8.4	19	-		-		-	
Radius of Curvature	R_c	ft	12	85	11	27	8.3	47	2.3	32
Radius of Curvature Ratio	R_c/w_{bkf}	-	1.9	9.1	1.0	2.5	0.57	3.2	0.32	4.5
Sediment										
d_{50} Description			Medium Gravel		-		-		-	
Reach Wide	d_{16}	mm	1.9		-		-		-	
	d_{35}	mm	8.9		-		-		-	
	d_{50}	mm	11		-		8.0		-	
	d_{84}	mm	64		-		-		-	
	d_{95}	mm	130		-		-		-	

Parameter	Notation	Units	Sandy Branch Reach 1			Sandy Branch Reach 2			UT1			UT2		
			Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max	Typical Section Values	Min	Max
Stream Type	-		C4			C4			C4			C4		
Drainage Area	DA	sq mi	0.505			0.606 - 0.723			0.0539			0.114		
Bankfull Discharge	Q _{bkf}	cfs	44.0			51.0 - 58.0			9.00			16.0		
Bankfull Cross-Sectional Area	A _{bkf}	SF	13.2	-	-	17.5	-	-	4.00	-	-	6.50	-	-
Average Velocity During Bankfull Event	v _{bkf}	fps	3.26	-	-	2.81 - 3.11	-	-	2.46	-	-	2.57	-	-
Cross Section														
Width at Bankfull	w _{bkf}	ft	14.0	-		16.0	-		7.00	-		9.00	-	
Maximum Depth at Bankfull	d _{max}	ft	1.30	-		1.50	-		0.800	-		1.00	-	
Mean Depth at Bankfull	d _{bkf}	ft	0.945	-		1.10	-		0.571	-		0.722	-	
Bankfull Width-to-Depth Ratio	w _{bkf} /d _{bkf}	-	14.8	-		14.6	-		12.3	-		12.5	-	
Depth Ratio	d _{max} /d _{bkf}	-	1.38	1.30	1.50	1.37	1.30	1.50	1.40	1.20	1.50	1.38	1.30	1.50
Bank Height Ratio	BHR	-	1.00	1.00	1.20	1.00	1.00	1.20	1.00	1.00	1.20	1.00	1.00	1.20
Floodprone Area Width	w _{fpa}	ft	-	> 30.8		-	> 35.2		-	> 15.4		-	> 19.8	
Entrenchment Ratio	ER	-	-	> 2.20		-	> 2.20		-	> 2.20		-	> 2.20	
Slope														
Valley Slope	S _{valley}	ft/ft	0.0104			0.00662			0.0112			0.00850		
Channel Slope	S _{channel}	ft/ft	0.00862	0.00171	0.0108	0.00524 - 0.00643	0.00443	0.0241	0.00973	0.00320	0.0198	0.00780	0.00364	0.0251
Profile														
Riffle Slope	S _{riffle}	ft/ft	-	0.00500	0.0243	-	0.00924	0.0350	-	0.0146	0.0231	-	0.00500	0.0286
Riffle Slope Ratio	S _{riffle} /S _{channel}	-	-	1.13	2.46	-	1.03	3.21	-	1.00	4.56	-	1.03	4.95
Pool Slope	S _{pool}	ft/ft	0.0000	0.0000	0.00200	0.0000	0.0000	0.00200	0.0000	0.0000	0.00200	0.0000	0.0000	0.00200
Pool Slope Ratio	S _{pool} /S _{channel}	-	0.000	0.000	0.232	0.000	0.000	0.382	0.000	0.000	0.206	0.000	0.000	0.256
Pool-to-Pool Spacing	L _{p-p}	ft	-	55.6	90.1	-	55.5	117	-	28.1	34.6	-	37.8	50.6
Pool Spacing Ratio	L _{p-p} /w _{bkf}	-	-	3.97	6.44	-	3.47	7.31	-	4.01	4.94	-	4.20	5.62
Pool Cross-Sectional Area at Bankfull	A _{pool}	SF	38.8 - 44.2	15.0	46.0	51.3 - 58.5	19.0	61.0	10.0 - 12.0	4.80	12.00	16.8 - 19.7	7.20	23.0
Pool Area Ratio	A _{pool} /A _{bkf}	-	2.93 - 3.34	1.10	3.50	2.93 - 3.34	1.10	3.50	2.50 - 3.00	1.20	3.10	2.58 - 3.03	1.10	3.50
Maximum Pool Depth at Bankfull	d _{pool}	ft	3.30	1.70	3.30	3.80	2.00	3.80	2.00	0.860	2.00	2.40	1.10	2.50
Pool Depth Ratio	d _{pool} /d _{bkf}	-	3.49	1.80	3.50	3.45	1.80	3.50	3.50	1.5	3.5	3.32	1.50	3.50
Pool Width at Bankfull	w _{pool}	ft	20.0	18.5	21.5	23.0	23.0		10.0	8.20	10.0	13.0	12.0	13.0
Pool Width Ratio	w _{pool} /w _{bkf}	-	1.43	1.32	1.54	1.44	1.44		1.43	1.17	1.43	1.44	1.33	1.44
Pattern														
Sinuosity	K	-	-	1.16		-	1.27		-	1.14		-	1.09	
Belt Width	w _{bit}	ft	-	37.7	59.8	-	39.1	81.1	-	24.0		-	28.2	28.4
Meander Width Ratio	w _{bit} /w _{bkf}	-	-	2.69	4.27	-	2.50	5.07	-	3.43		-	3.20	3.16
Linear Wavelength	LW	ft	-	106	147	-	106	171	-	58.8		-	79.1	94.7
Linear Wavelength Ratio	LW/w _{bkf}	-	-	7.57	10.5	-	6.63	10.7	-	8.40		-	8.79	10.5
Meander Length	L _m	ft	-	123	173	-	129	211	-	70.1		-	88.0	106
Meander Length Ratio	L _m /w _{bkf}	-	-	8.79	12.4	-	8.06	13.2	-	10.0		-	9.78	11.8
Radius of Curvature	R _c	ft	-	31.0	55.0	-	32.0	54.0	-	15.5	21.5	-	20.5	42.5
Radius of Curvature Ratio	R _c /w _{bkf}	-	-	2.21	3.93	-	2.00	3.38	-	2.21	3.07	-	2.28	4.72

Appendix 10
Maintenance Plan

Maintenance Plan

The site shall be monitored on a regular basis and a physical inspection of the site shall be conducted a minimum of once per year throughout the post-construction monitoring period until performance standards are met. These site inspections may identify site components and features that require routine maintenance. Routine maintenance should be expected most often in the first two (2) years following site construction and may include the following:

Table1: Maintenance Plan

Component/Feature	Maintenance through project close-out
Stream	Routine channel maintenance and repair activities may include chinking of in-stream structures to prevent piping, securing of loose coir matting, and supplemental installations of live stakes and other target vegetation along the channel. Areas where storm water and floodplain flows intercept the channel may also require maintenance to prevent bank erosion. If beaver become active on the site, Wildlands will contract with the USDA to trap the beaver and remove the dams.
Vegetation	Vegetation shall be maintained to ensure the health and vigor of the targeted community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be controlled by mechanical and/or chemical methods. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations.
Site boundary	Site boundaries shall be identified in the field to ensure clear distinction between the mitigation site and adjacent properties. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by site conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis.

Appendix 11
Credit Release Schedule

Credit Release Schedule

All credit releases will be based on the total credit generated as reported by the as-built survey of the mitigation site. Under no circumstances shall any mitigation project be debited until the necessary DA authorization has been received for its construction or the District Engineer (DE) has otherwise provided written approval for the project in the case where no DA authorization is required for construction of the mitigation project. The DE, in consultation with the Interagency Review Team (IRT), will determine if performance standards have been satisfied sufficiently to meet the requirements of the release schedules below. In cases where some performance standards have not been met, credits may still be released depending on the specifics of the case. Monitoring may be required to restart or be extended, depending on the extent to which the site fails to meet the specified performance standard. The release of project credits will be subject to the criteria described as follows:

Table A: Credit Release Schedule – Stream Credits

Credit Release Milestone	Credit Release Activity	Interim Release	Total Released
1	Site establishment	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	Year 1 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	40%
4	Year 2 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	50%
5	Year 3 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	60%
6	Year 4 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	65% (75%*)
7	Year 5 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	75% (85%*)
8	Year 6 monitoring report demonstrates that channels are stable and interim performance standards have been met	5%	80% (90%*)
9	Year 7 monitoring report demonstrates that channels are stable and interim performance standards have been met	10%	90% (100%*)

*10% reserve credits to be held back until the bankfull performance standard has been met.

Table B: Credit Release Schedule – Wetlands Credits

Credit Release Milestone	Credit Release Activity	Interim Release	Total Released
1	Site establishment	0%	0%
2	Completion of all initial physical and biological improvements made pursuant to the Mitigation Plan	30%	30%
3	First year monitoring report demonstrates performance standards are being met	10%	40%
4	Second year monitoring report demonstrates performance standards are being met	10%	50%
5	Third year monitoring report demonstrates performance standards are being met	15%	65%
6	Fourth year monitoring report demonstrates performance standards are being met	5%	70%
7	Fifth year monitoring report demonstrates performance standards are being met; Provided that all performance standards are met, the IRT may allow the DMS to discontinue hydrologic monitoring after the fifth year, but vegetation monitoring must continue for an additional two years after the fifth year for a total of seven years	15%	85%
8	Sixth year monitoring report demonstrates performance standards are being met	5%	90%
9	Seventh year monitoring report demonstrates performance standards are being met, and project has received close-out approval	10%	100%

1. Initial Allocation of Released Credits

The initial allocation of released credits, as specified in the mitigation plan can be released by DMS without prior written approval of the DE upon satisfactory completion of the following activities:

- a. Approval of the final Mitigation Plan.
- b. Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property.
- c. Completion of project construction (the initial physical and biological improvements to the mitigation site) pursuant to the mitigation plan; per the DMS Instrument, construction means that a mitigation site has been constructed in its entirety, to include planting, and an as-built report has been produced. As-built reports must be sealed by an engineer prior to project closeout, if appropriate but not prior to the initial allocation of released credits.
- d. Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required.

2. Subsequent Credit Releases

All subsequent credit releases must be approved by the DE, in consultation with the IRT, based on a determination that required performance standards have been achieved. For stream projects a reserve of 10% of a site's total stream credits shall be released after two bankfull events have occurred, in separate years, provided the channel is stable and all other performance standards are met. In the event that less than two bankfull events occur during the monitoring period, release of these reserve credits shall be at the discretion of the IRT. As projects approach milestones associated with credit release, the DMS will submit a request for credit release to the DE along with documentation substantiating achievement of criteria required for release to occur. This documentation will be included with the annual monitoring report.

Appendix 12
Financial Assurance

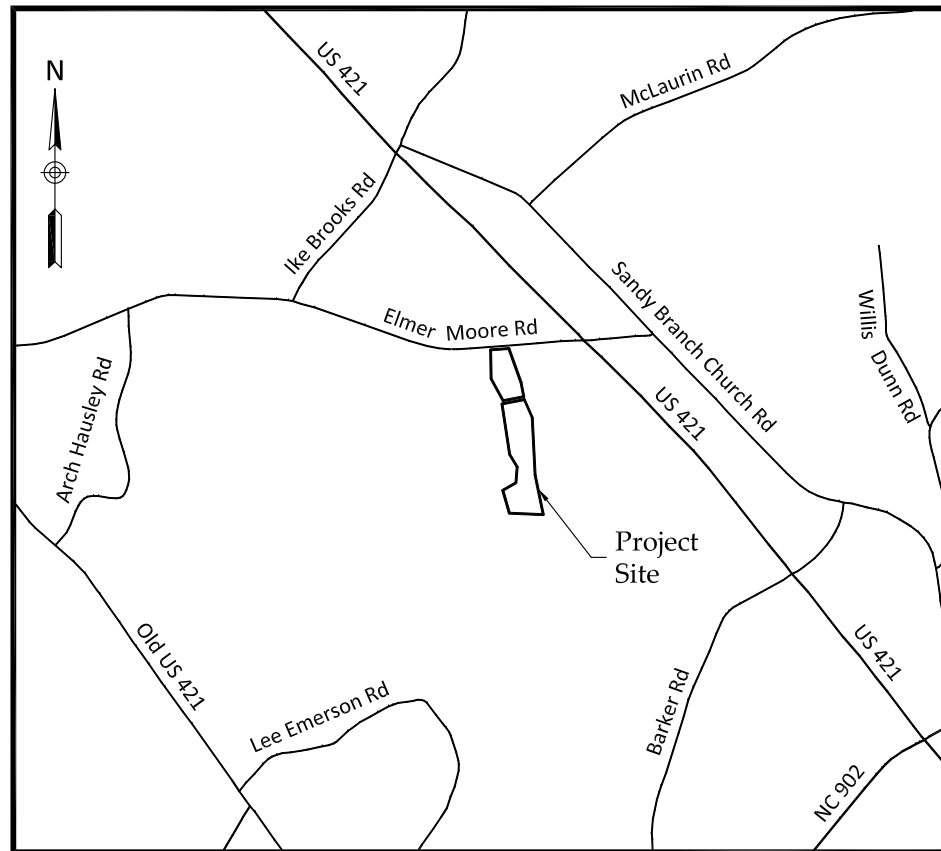
Financial Assurances

Pursuant to Section IV H and Appendix III of the Division of Mitigation Service's In-Lieu Fee Instrument dated July 28, 2010, the North Carolina Department of Environment and Natural Resources has provided the US Army Corps of Engineers Wilmington District with a formal commitment to fund projects to satisfy mitigation requirements assumed by DMS. This commitment provides financial assurance for all mitigation projects implemented by the program.

Sandy Branch Mitigation Site

Cape Fear River Basin 03030003

Chatham County, North Carolina



Vicinity Map
Not to Scale

**PRELIMINARY PLANS
DECEMBER 2019**

Stream Origins

Stream	Latitude	Longitude
Sandy Branch	N35° 38' 45.69"	W79° 23' 18.26"
UT1	N35° 38' 38.21"	W79° 23' 12.95"
UT2	N35° 38' 26.81"	W79° 23' 16.34"

Sheet Index

Title Sheet	0.1
Project Overview	0.2
General Notes and Symbols	0.3
Stream Plan and Profile	1.01-1.09
Planting Tables	2.0
Planting Plan	2.01
Erosion and Sediment Control Plan Overview	To be Included in Final Plans
Erosion and Sediment Control Plan	To be Included in Final Plans
Fencing Plan Overview	4.0
Fencing Plan	4.01-4.02
Details	5.01-5.12

Project Directory

Engineering:
Wildlands Engineering, Inc.
License No. F-0831
312 West Millbrook Road
Suite 225
Raleigh, NC 27609
John Hutton, Project Manager
Greg Turner, PE, Project Engineer
919.851.9986

Owner:
Todd Stephen Moore (Trustee)
Lu Anne Johnson Moore (Trustee)
491 Elmer Moore Road
Bear Creek, NC 27207

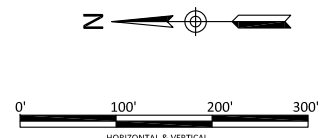
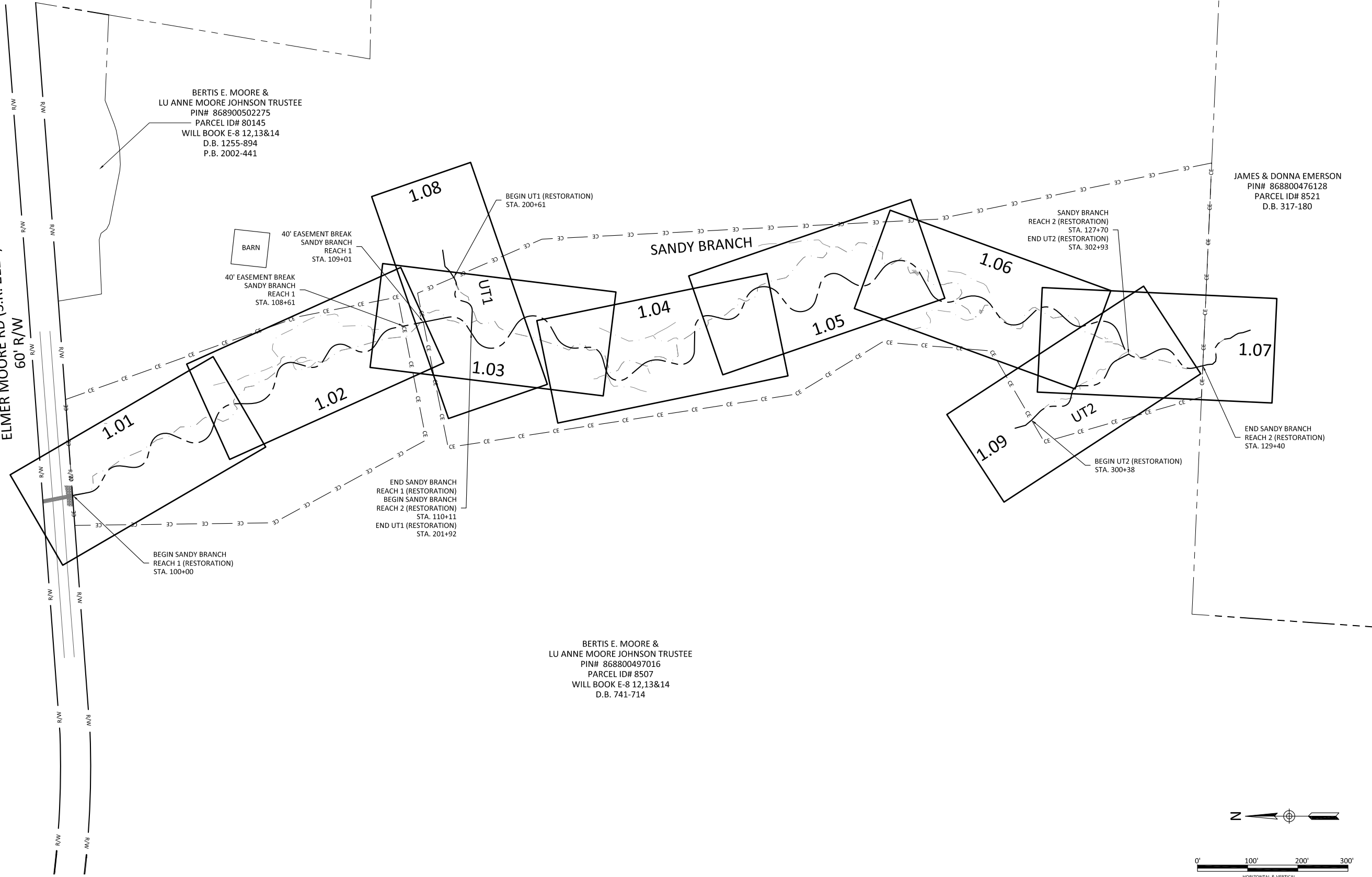
Surveying:
Summit Design and Engineering Services, PLLC
504 Meadowland Drive
Hillsborough, NC 27278
Brantly Wells, PLS
919.732.3883

USACE Action ID No. SAW-2018-01167



December 12, 2019
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ELMER MOORE RD (S.R. 2126)
60' R/W



Revisions:

Date:	12.12.2019
Job Number:	005-02173
Project Engineer:	GAT
Drawn By:	CAW
Checked By:	ANA

0.2

Sheet

Sandy Branch Mitigation Site
Chatham County, North Carolina

Project Overview

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

WILDLANDS
ENGINEERING

312 W. Millbrook Rd, Suite 225
Raleigh, NC 27609
Tel: 919.851.9986
License No. F-0831

December 12, 2019
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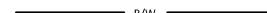

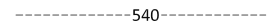









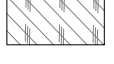
General Notes

(To be Included in Final Plans)

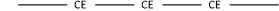










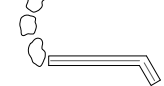




Construction Sequence

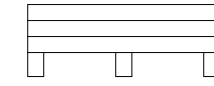




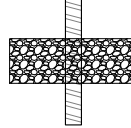

(To be Included in Final Plans)

Existing Features

-  Existing Property Boundary
-  Existing NCDOT Right-of-Way
-  Existing Storm Pipe
-  Existing 5' Major Contour
-  Existing 1' Minor Contour
-  Existing Thalweg
-  Existing Top of Bank
-  Existing Edge of Pavement
-  Existing Fence
-  Existing Evergreen Tree
-  Existing Deciduous Tree
-  Existing Fiber Optic Marker
-  Existing Wetland
-  Existing Bedrock

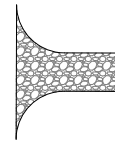

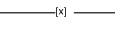
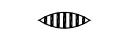
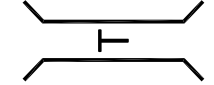
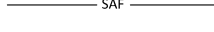

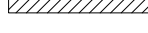

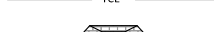

Proposed Features

-  Proposed Conservation Easement
-  Proposed Stream Alignment
-  Proposed Bankfull/Top of Bank
-  Proposed 5' Major Contour
-  Proposed 1' Minor Contour
-  Proposed Fence
See Details 1 & 3, Sheet 5.12
-  Proposed Angled Log Riffle
See Detail 1, Sheet 5.01
-  Proposed Chunky Riffle
See Detail 2, Sheet 5.01
-  Proposed Jazz Riffle
See Detail 3, Sheet 5.01
-  Proposed Native Material Riffle
See Detail 4, Sheet 5.01
-  Proposed Woody Riffle
See Detail 1, Sheet 5.02
-  Proposed Log J-Hook
See Detail 3, Sheet 5.03
-  Proposed Boulder Sill
See Detail 2, Sheet 5.02
-  Proposed Angled Log Sill
See Detail 1, Sheet 5.03
-  Proposed Lunker Log
See Detail 1, Sheet 5.04
-  Proposed Log Vane
See Detail 4, Sheet 5.03

-  Proposed Lunker Structure
See Detail 1, Sheet 5.05
-  Proposed Transplanted Sod Mat
See Detail 2, Sheet 5.04
-  Proposed Brush Toe
See Details 1 & 2, Sheet 5.06
-  Proposed Boulder Toe
See Detail 2, Sheet 5.03
-  Proposed Rock Floodplain Outlet
(To be Included in Final Plans)
See Detail 1, Sheet 5.07
-  Proposed Culvert Crossing
See Detail 1, Sheet 5.08 (Sandy Branch)
See Detail 1, Sheet 5.09 (UT1)
-  Proposed Gate
See Detail 2, Sheet 5.12

Erosion Control Features

(To be Included in Final Plans)

-  Proposed Construction Entrance
See Detail 3, Sheet 5.10
-  Proposed Pump-Around System
See Detail 4, Sheet 5.10
-  Proposed Silt Fence
See Detail 1, Sheet 5.11
-  Proposed Silt Fence Gravel Outlet
See Detail 2, Sheet 5.11
-  Proposed Temporary Stream Crossing - Timber Mat
See Detail 3, Sheet 5.11
-  Proposed Tree Protection Fencing
See Detail 4, Sheet 5.11
-  Proposed Haul Road
-  Proposed Stockpile/Staging Area
-  Proposed Limits of Disturbance
-  Temporary Construction Easement
-  Proposed Check Dam

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General Notes and Symbols

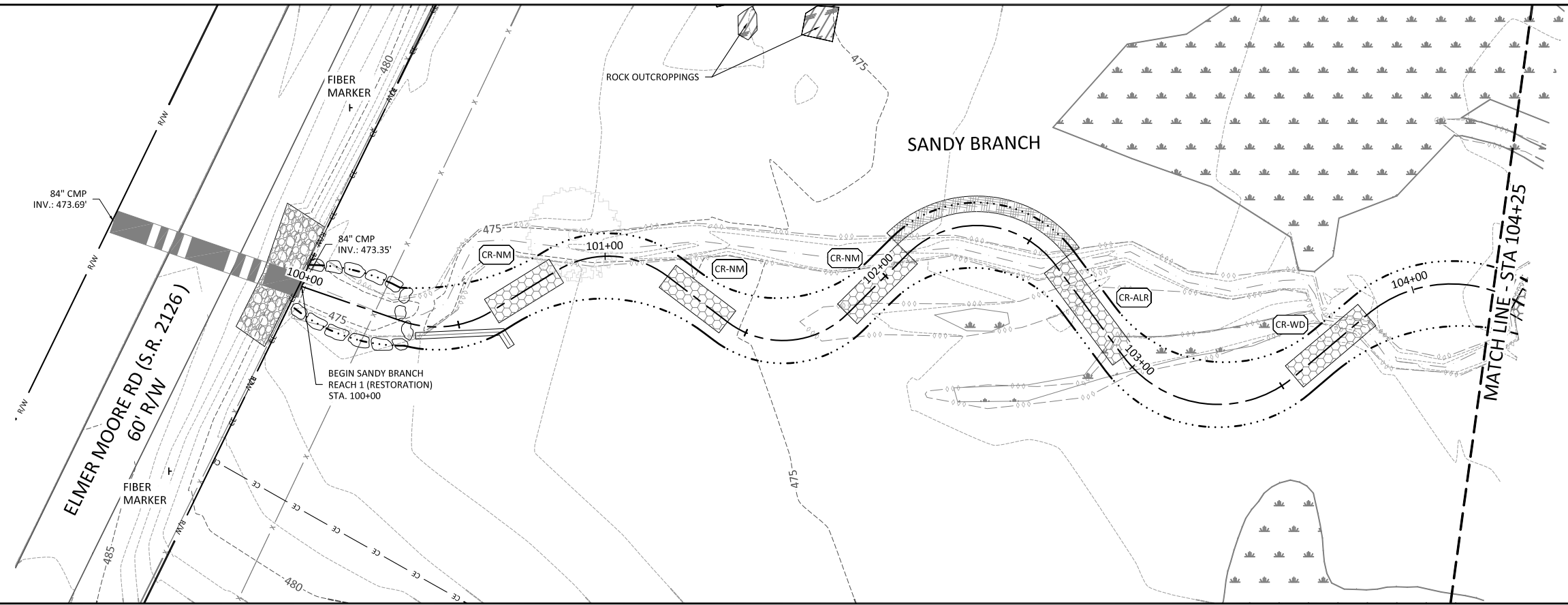
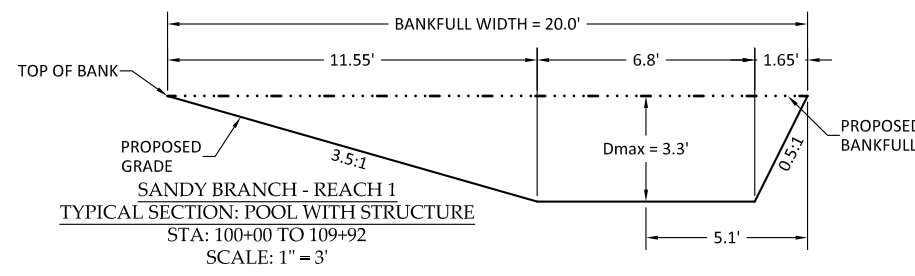
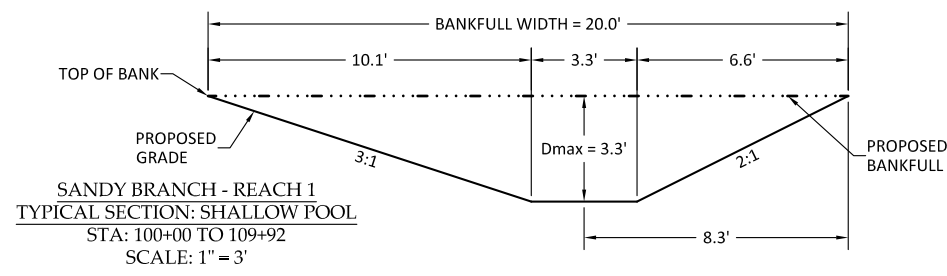
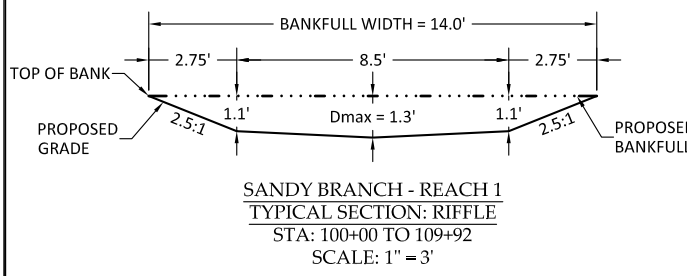
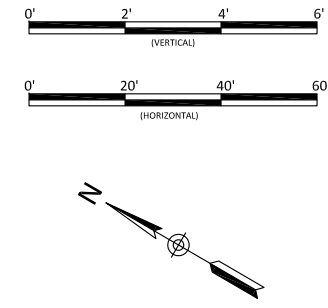
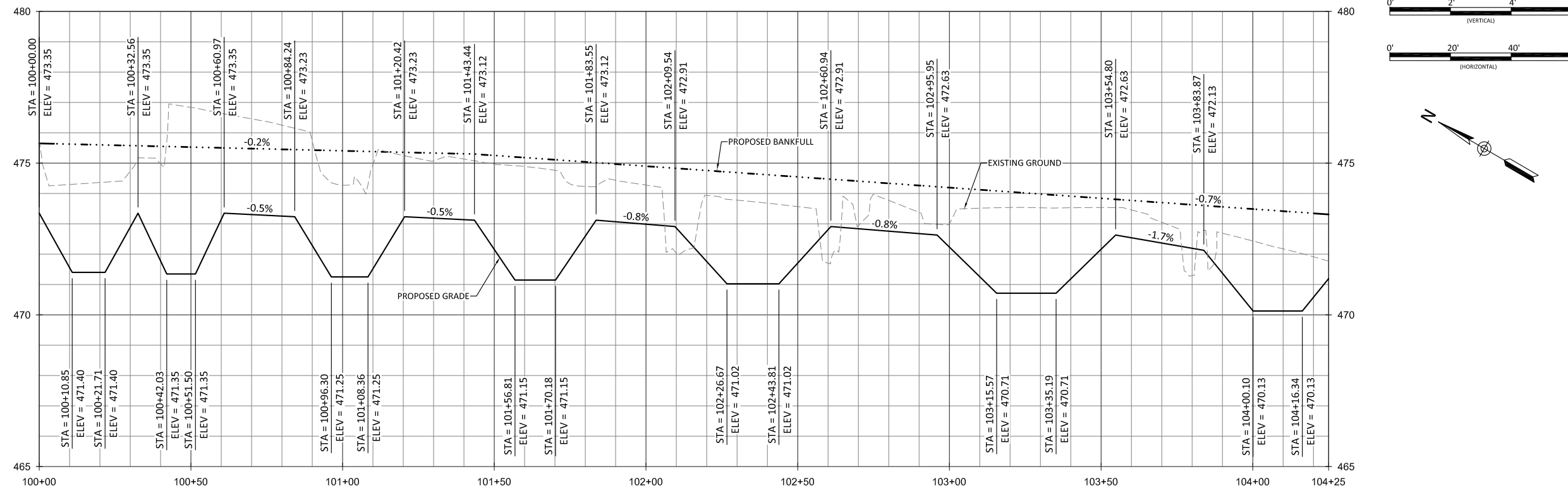
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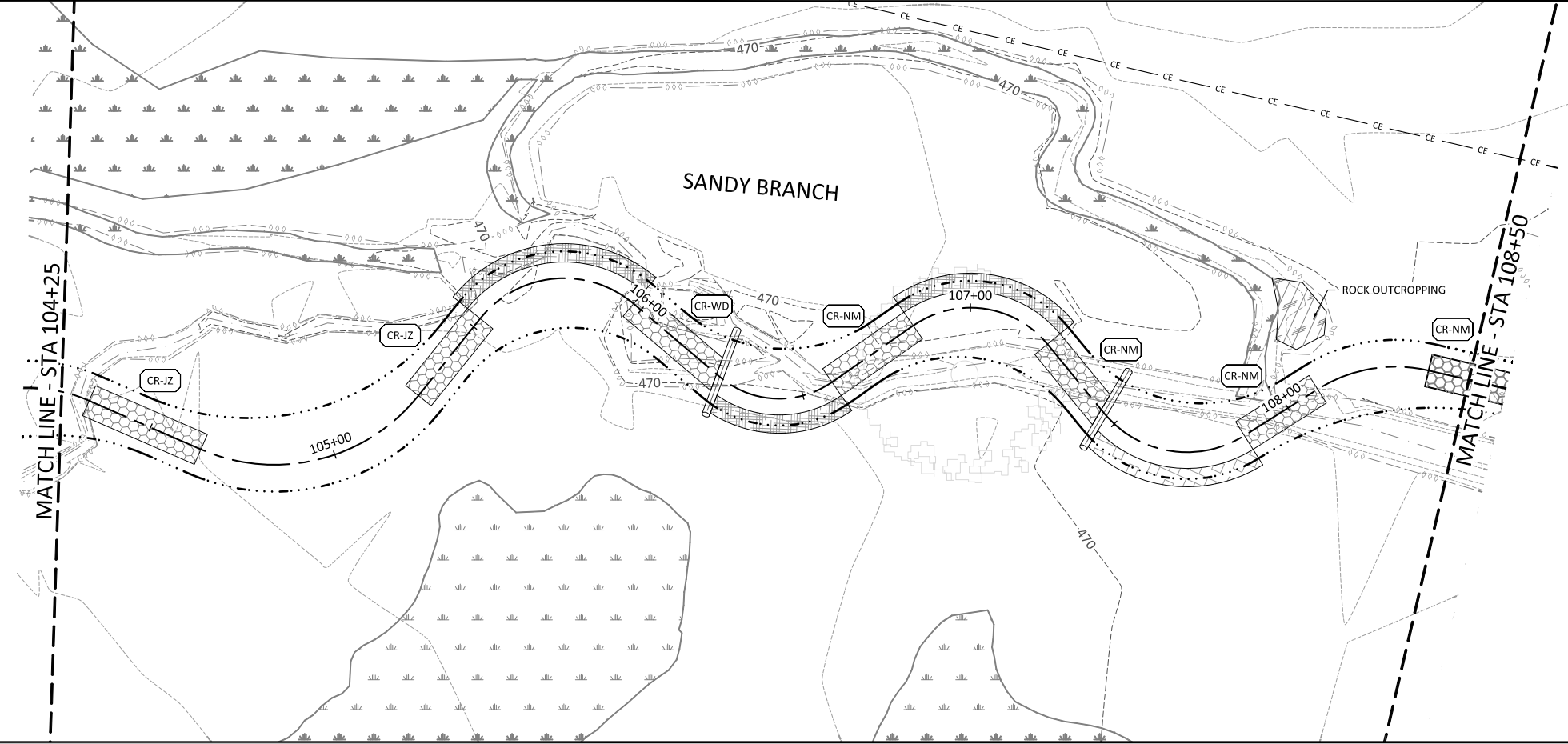
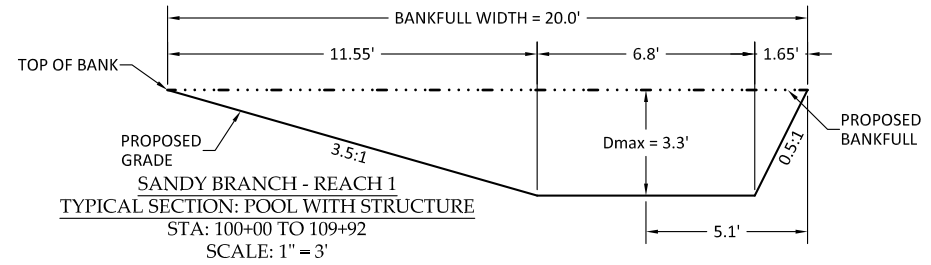
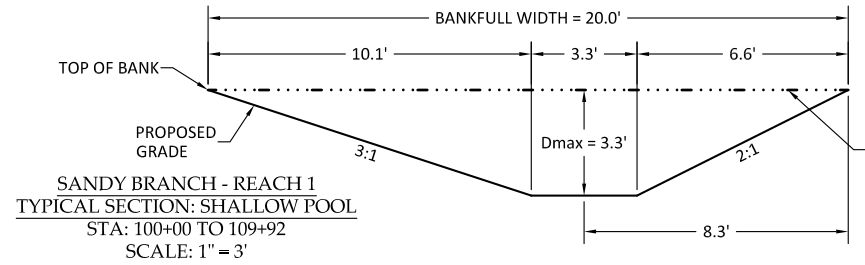
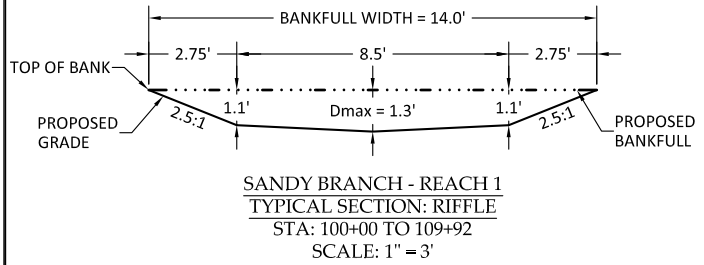
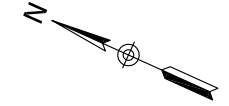
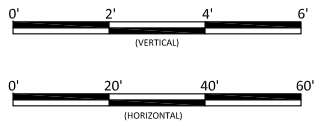
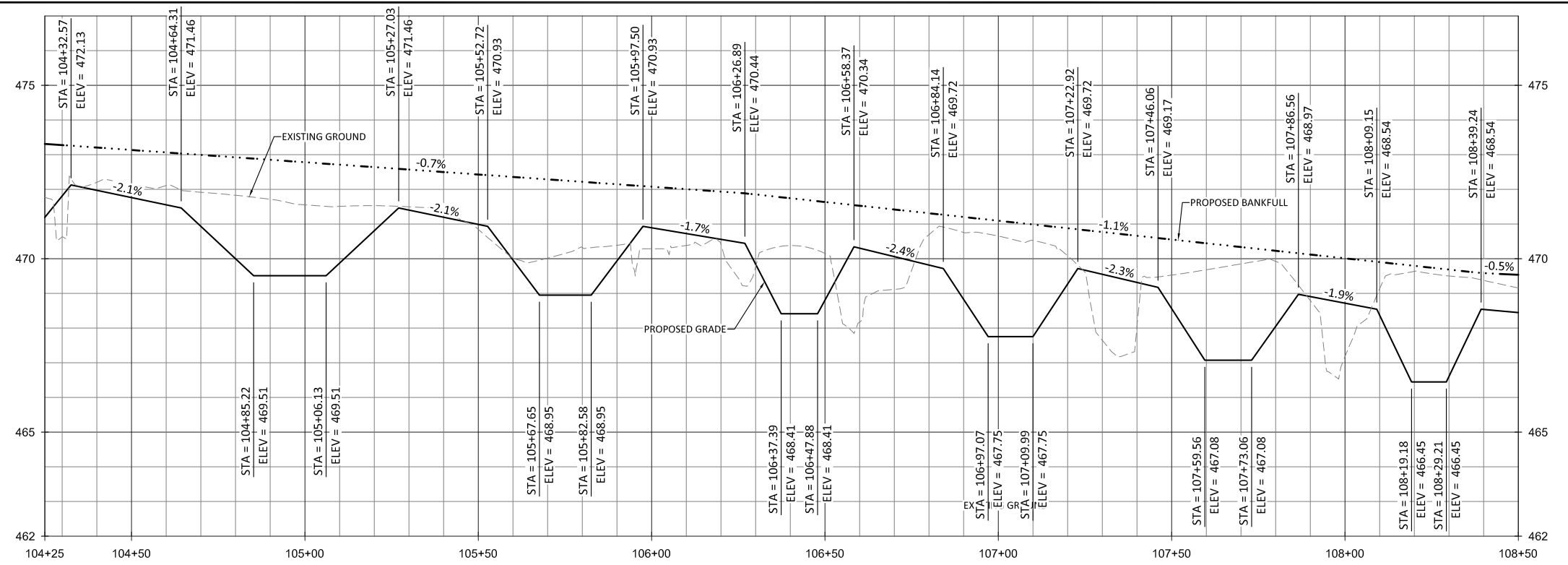
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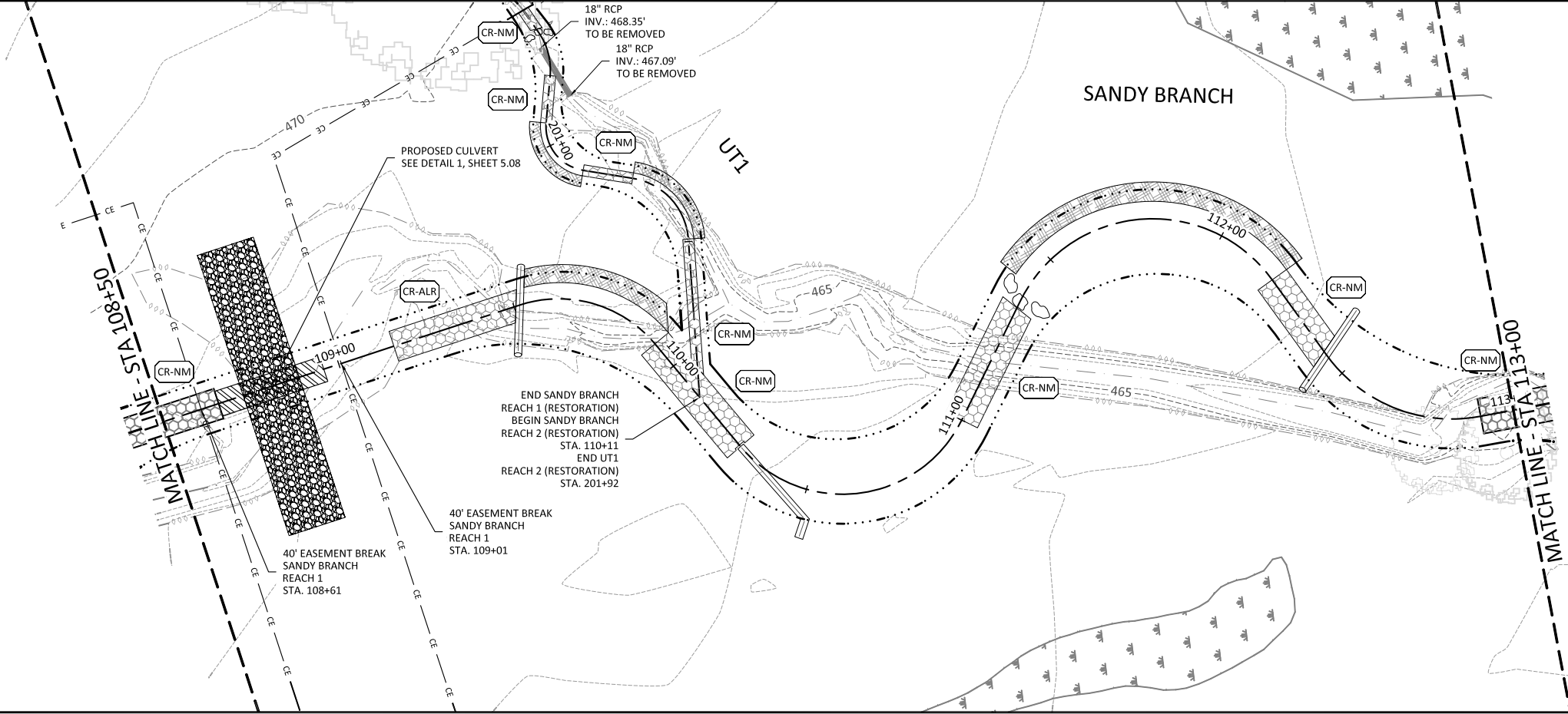
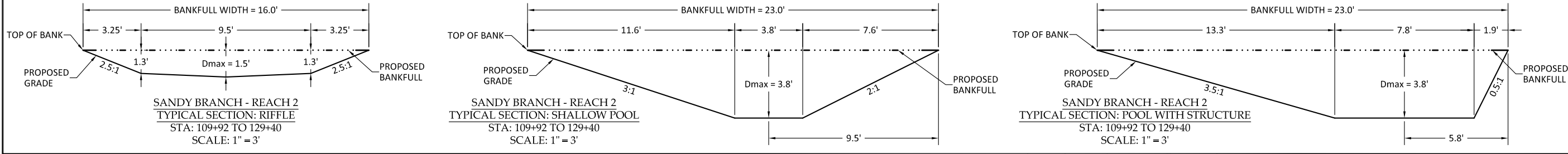
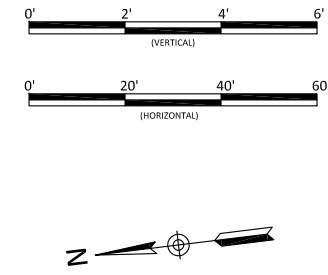
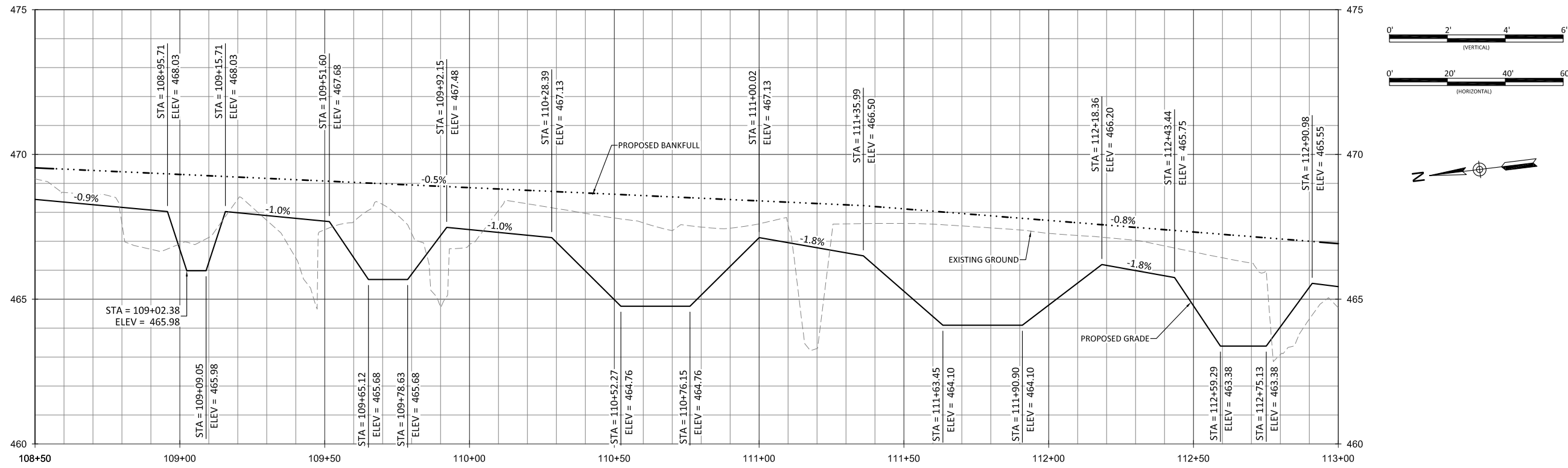
Sandy Branch Mitigation Site
Chatham County, North Carolina
Sandy Branch
Stream Plan and Profile

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Job Number: 005-02173
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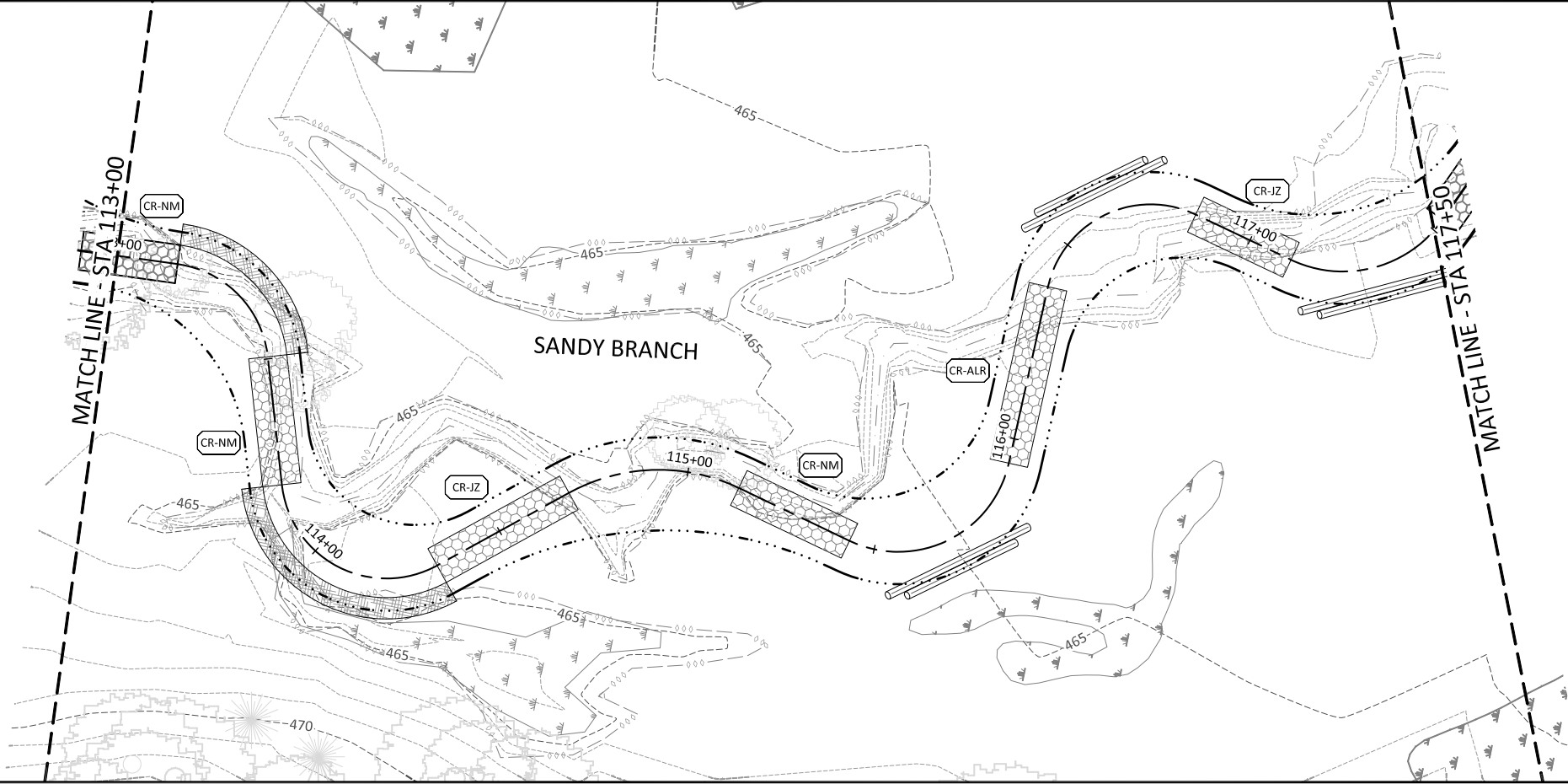
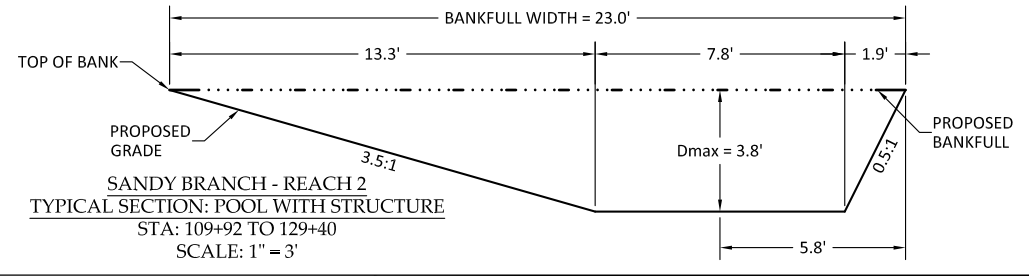
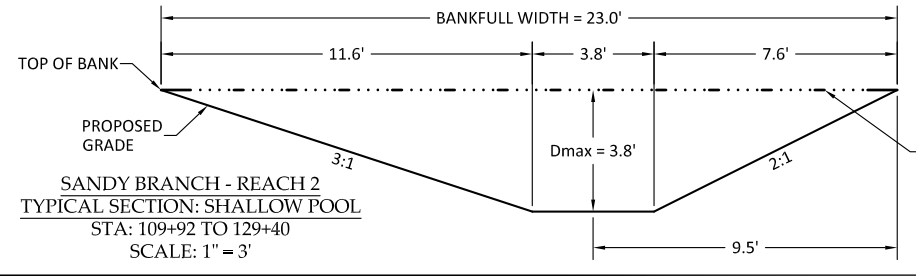
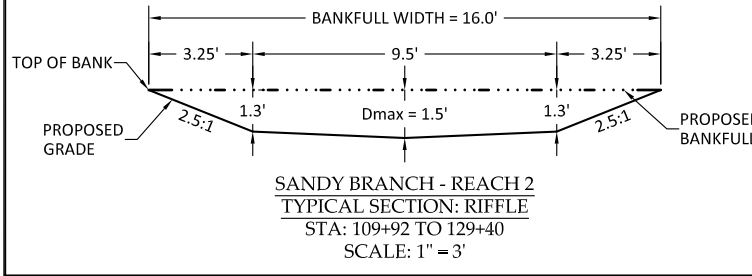
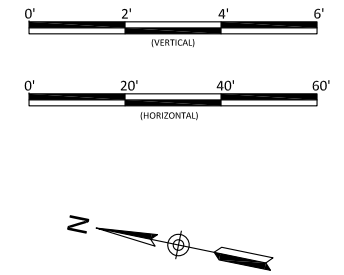
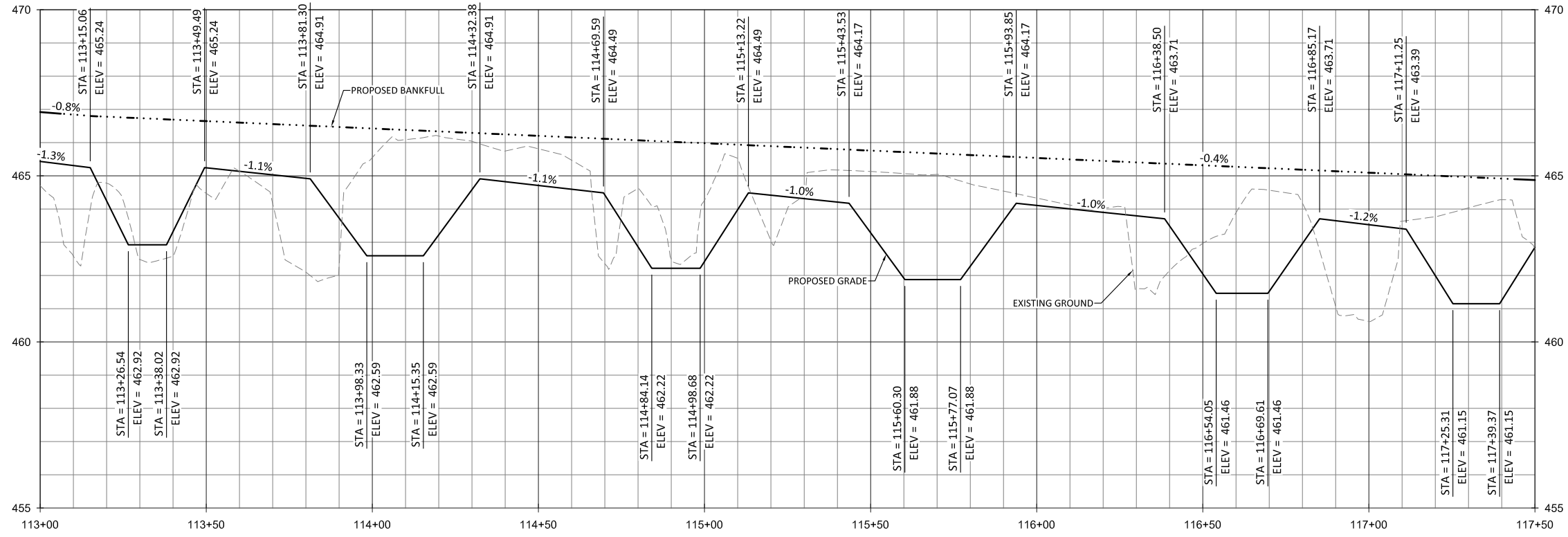
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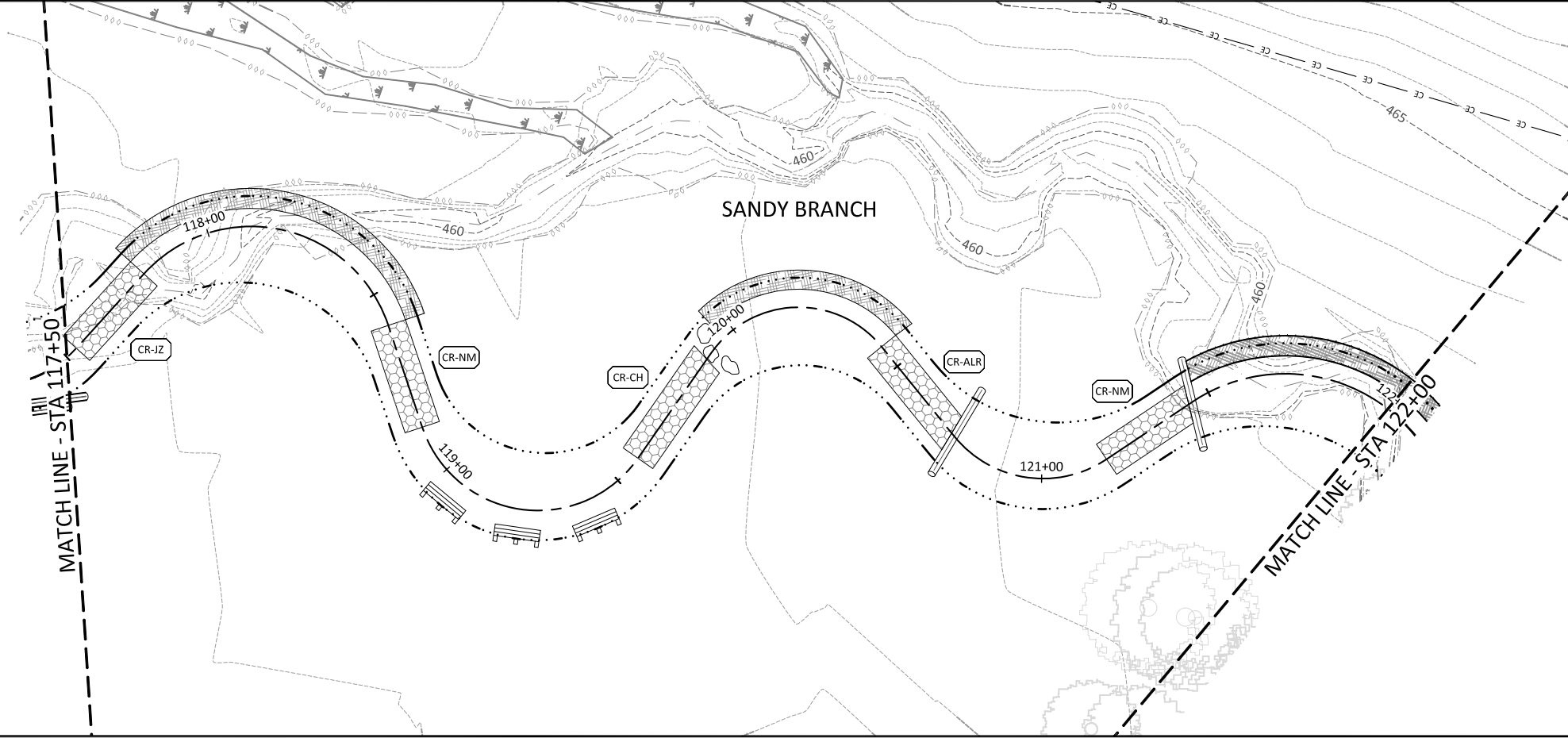
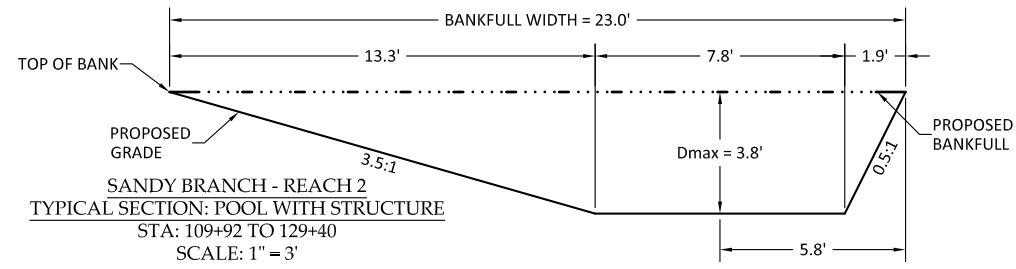
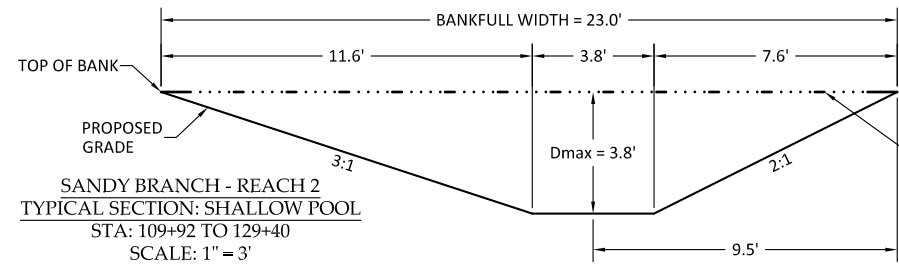
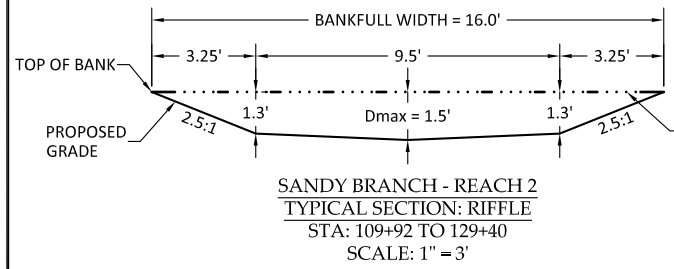
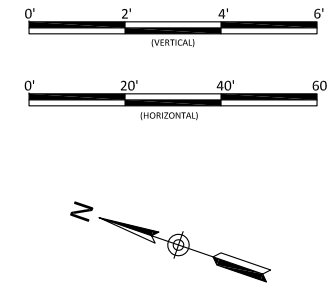
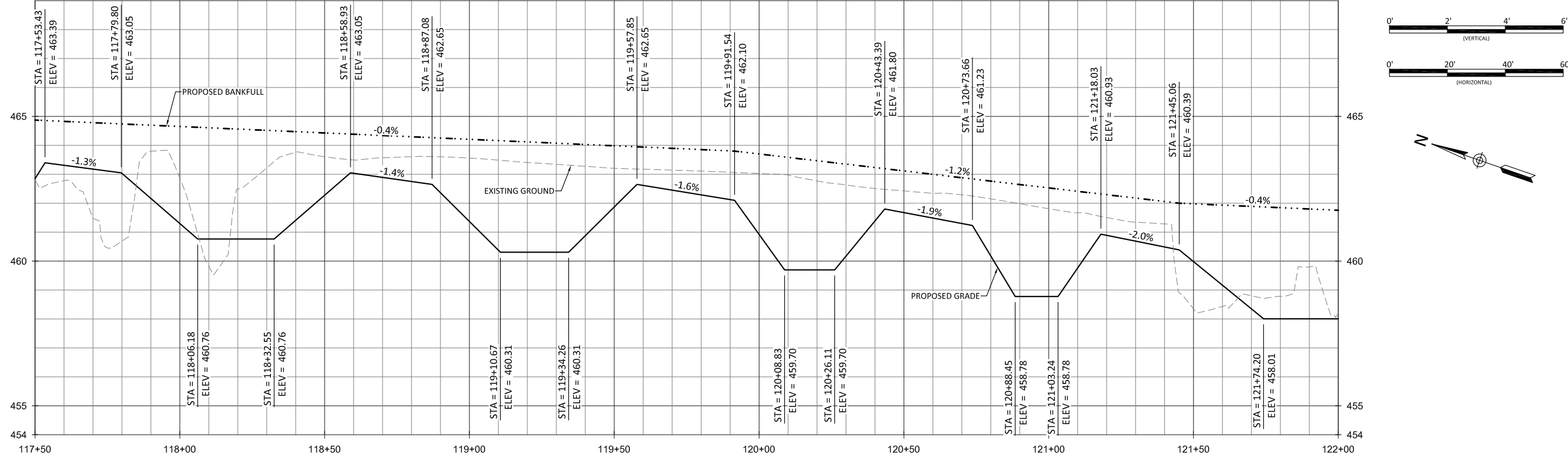
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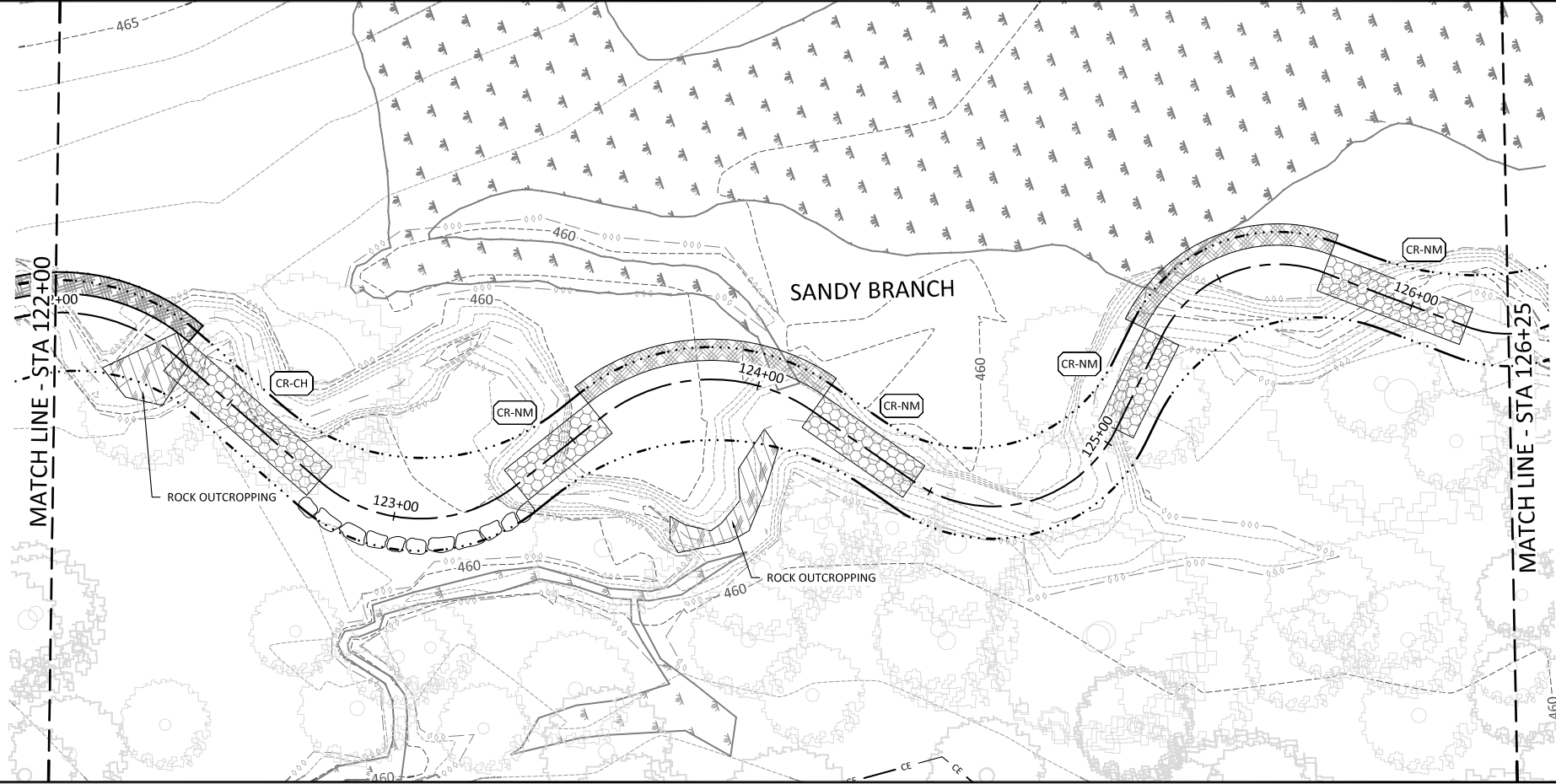
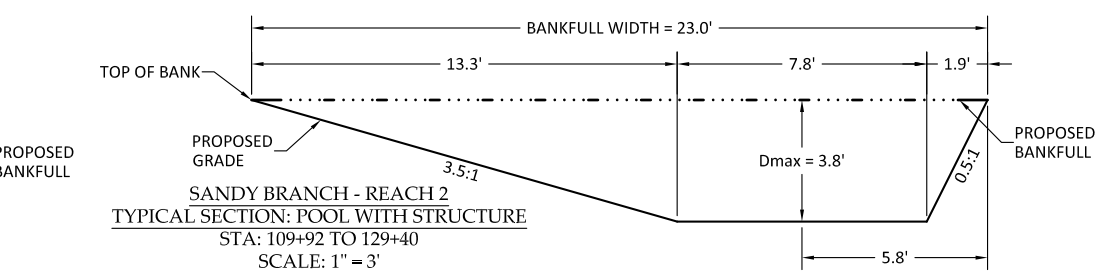
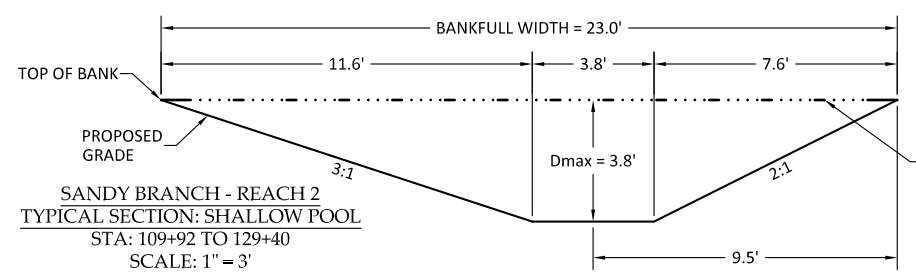
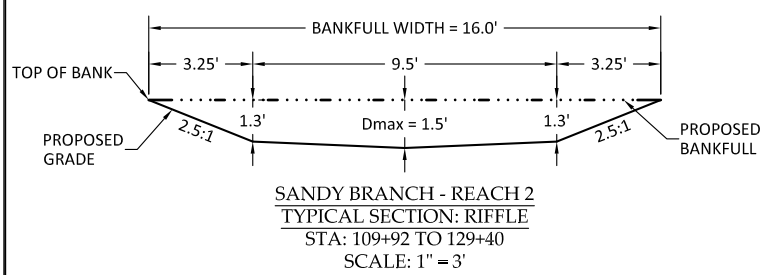
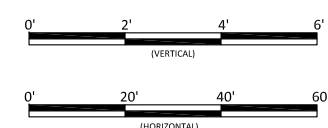
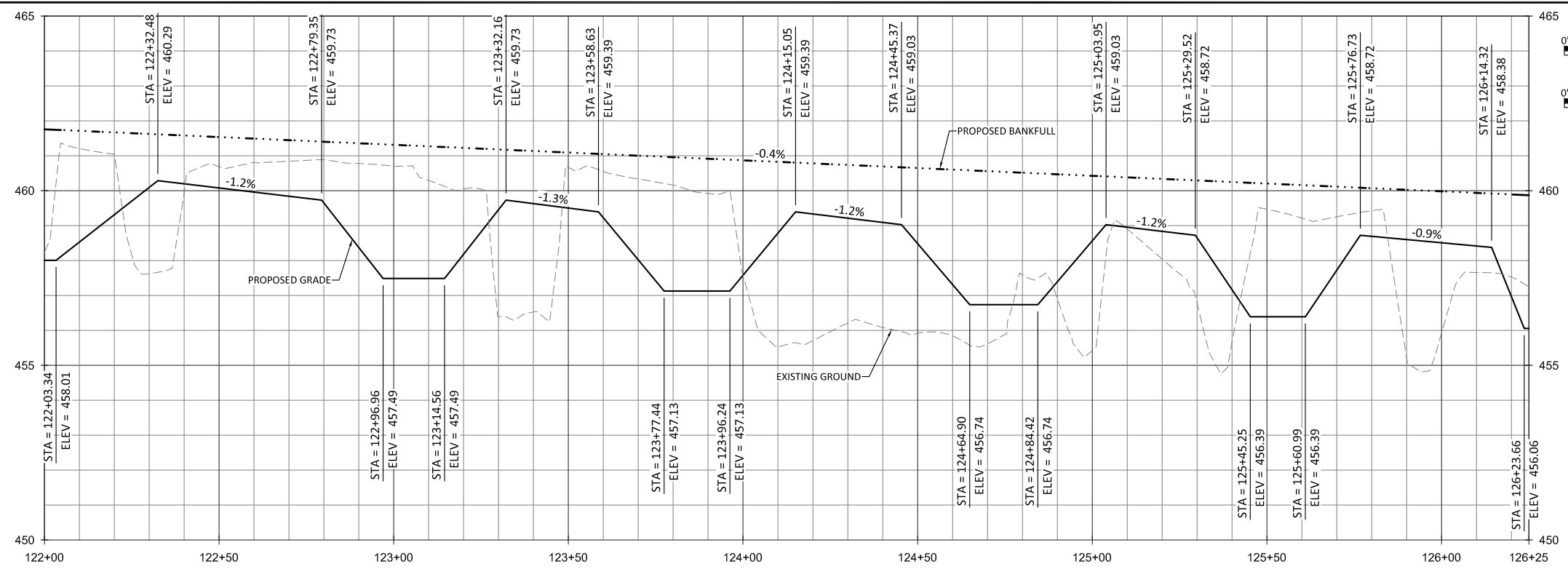
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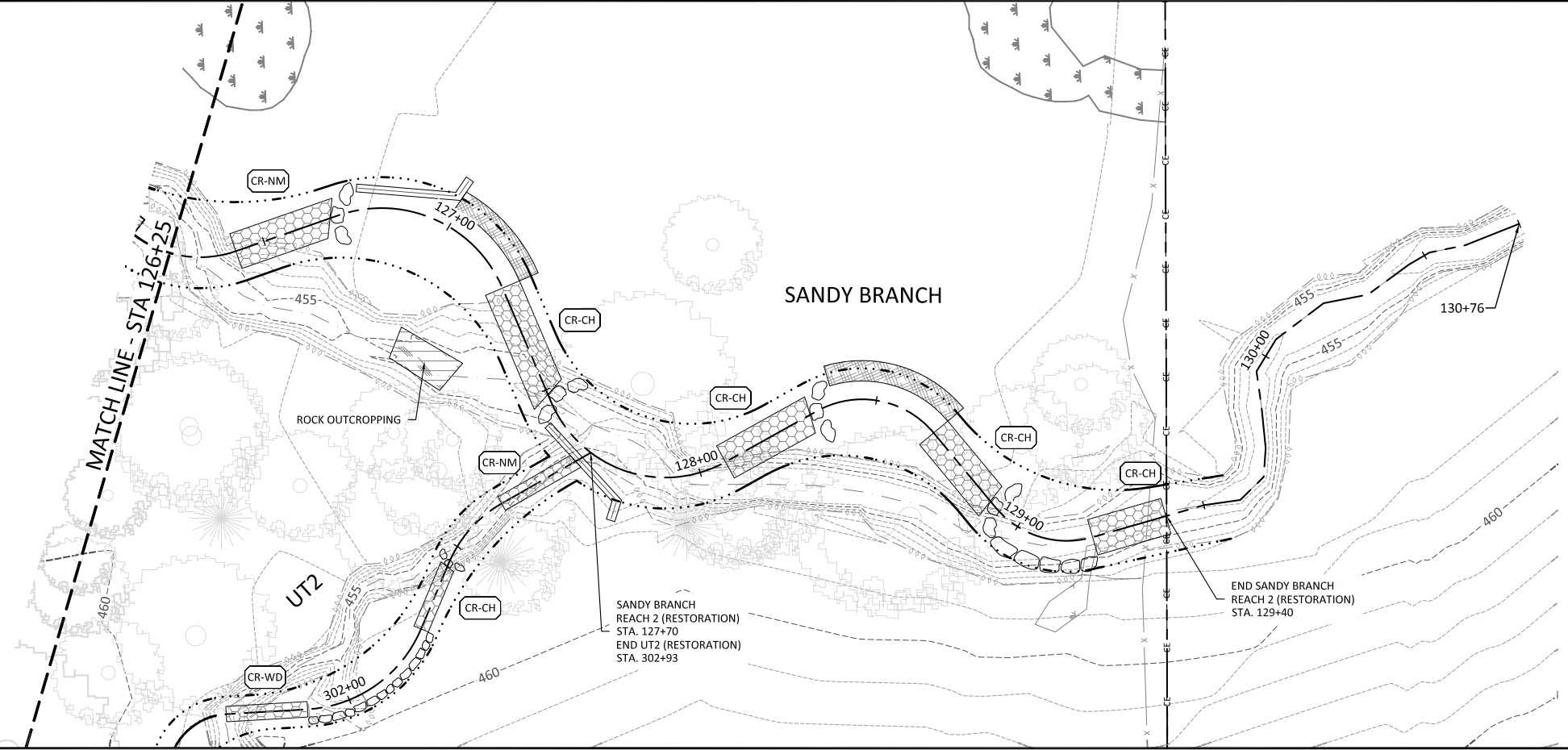
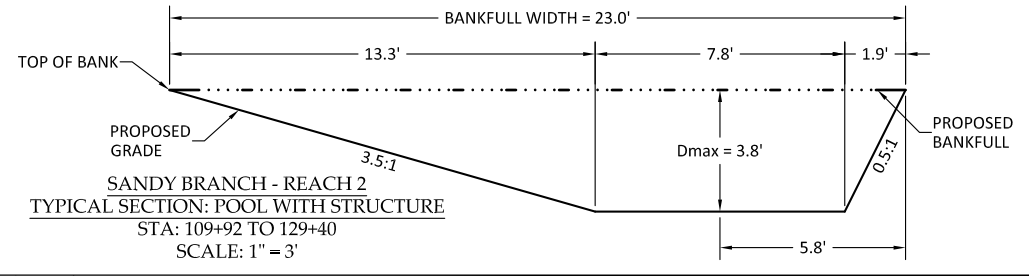
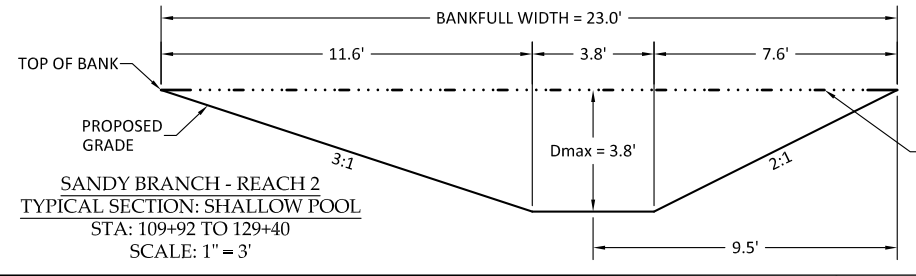
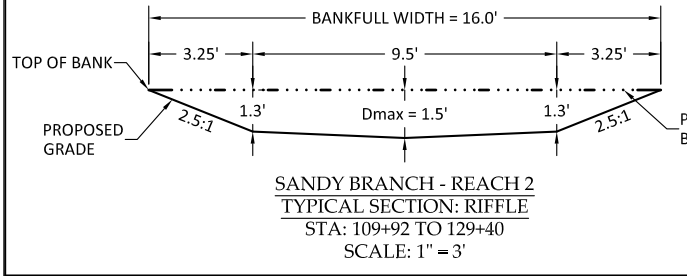
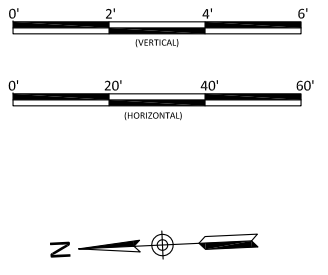
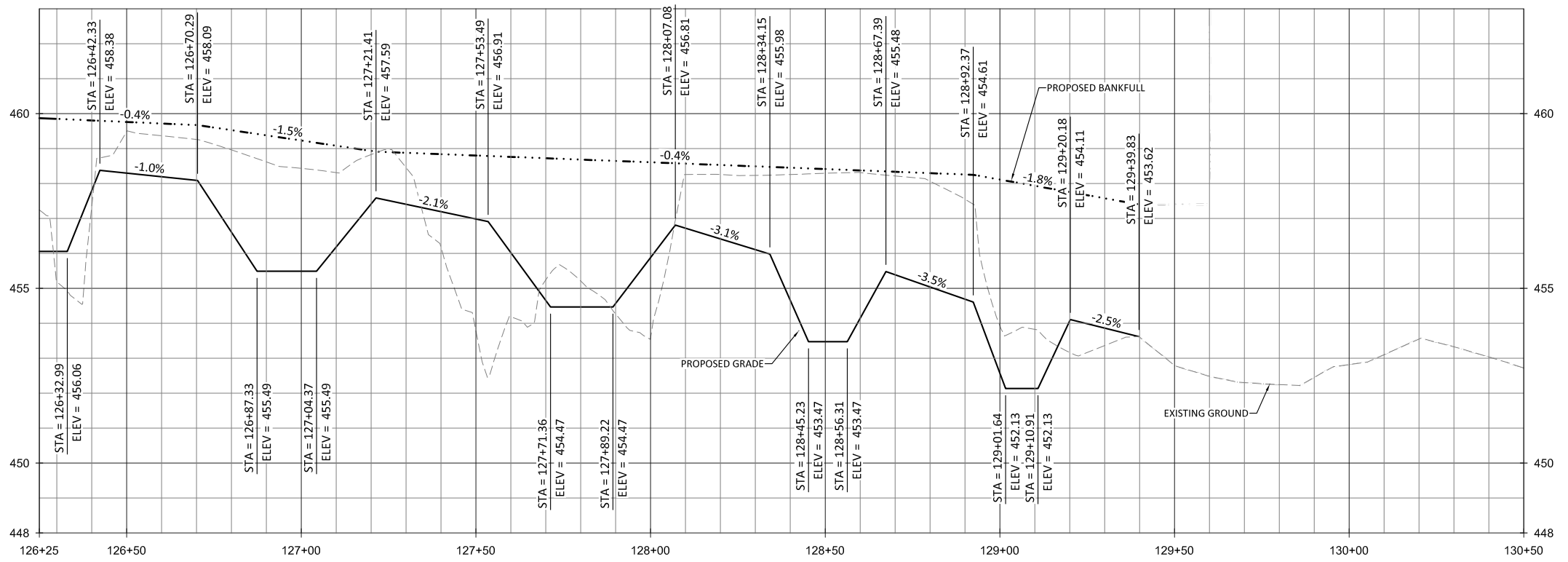
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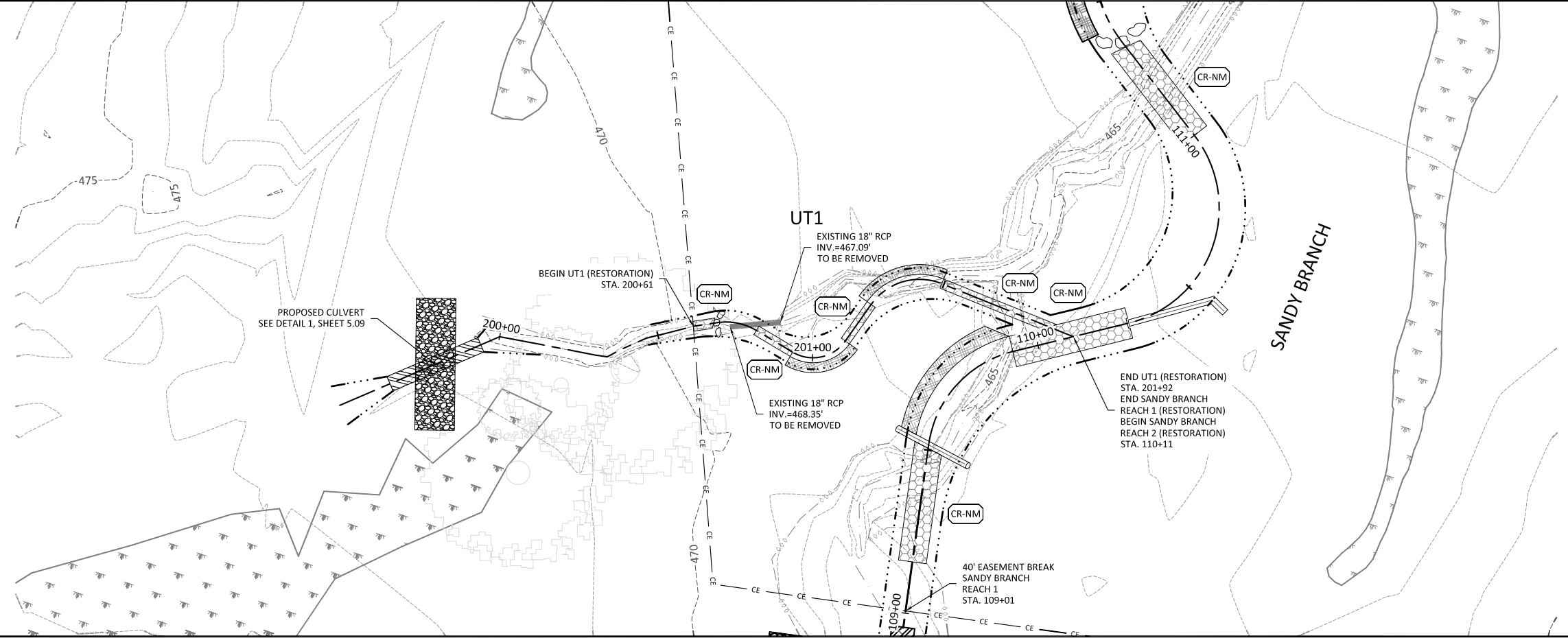
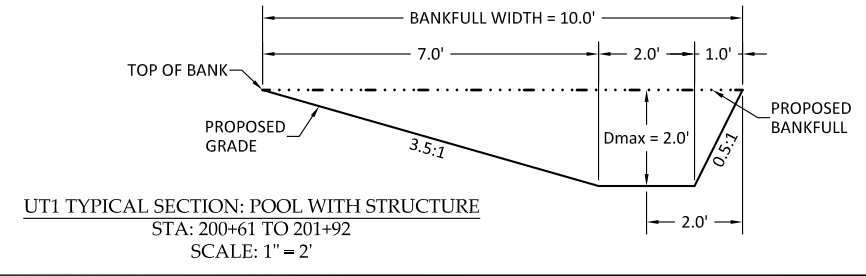
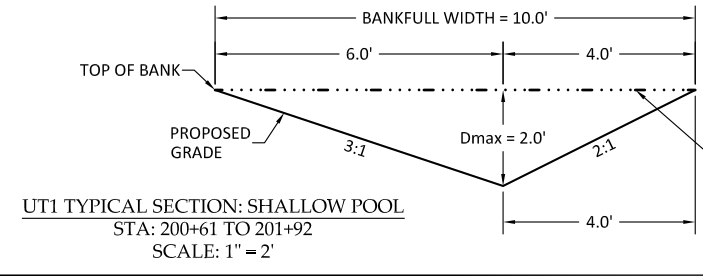
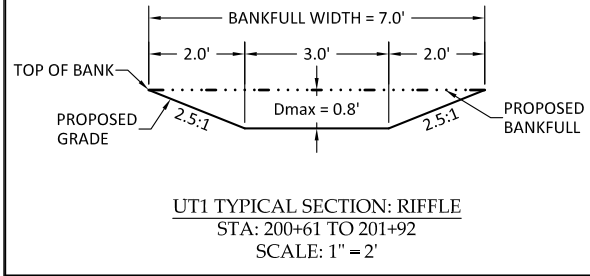
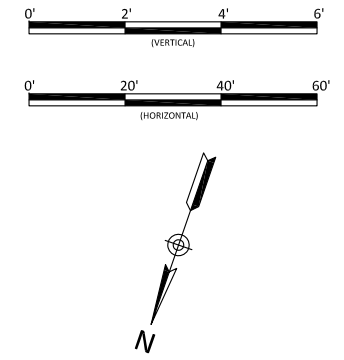
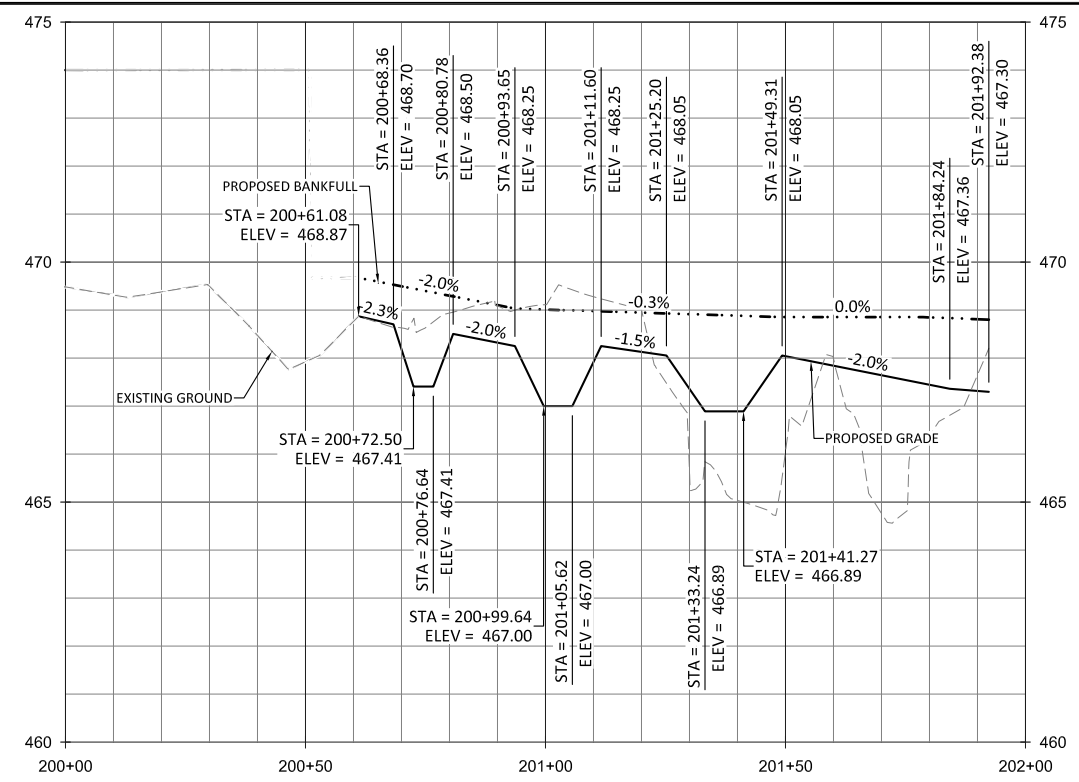
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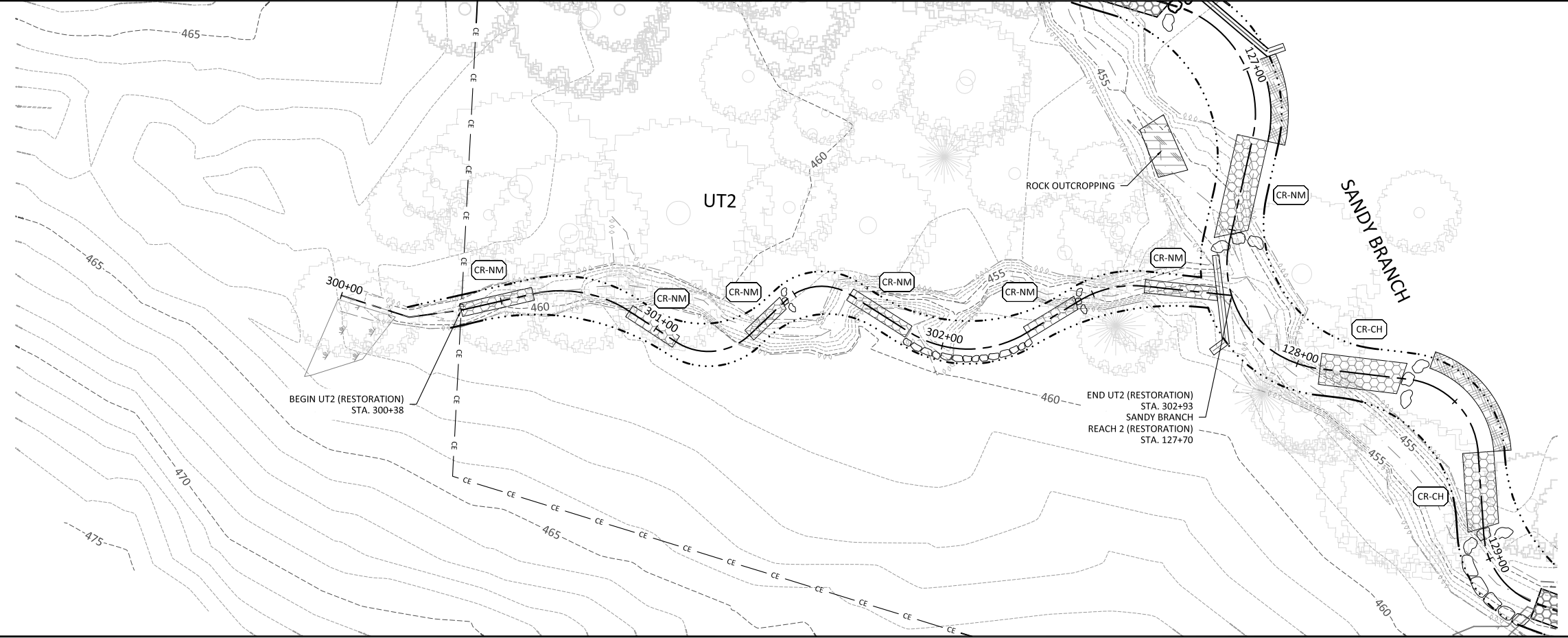
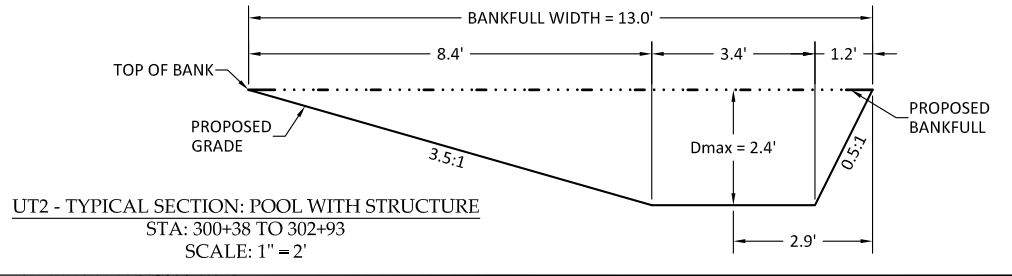
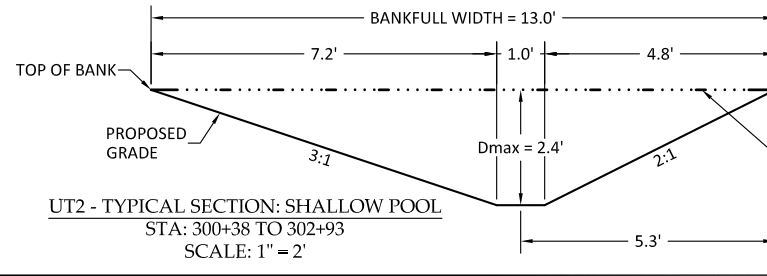
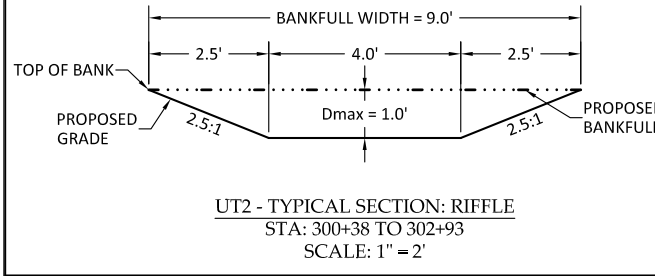
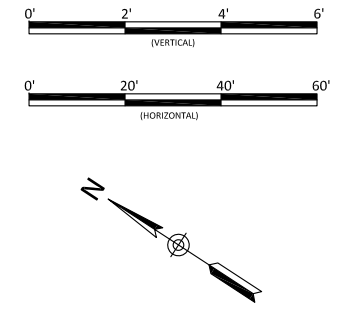
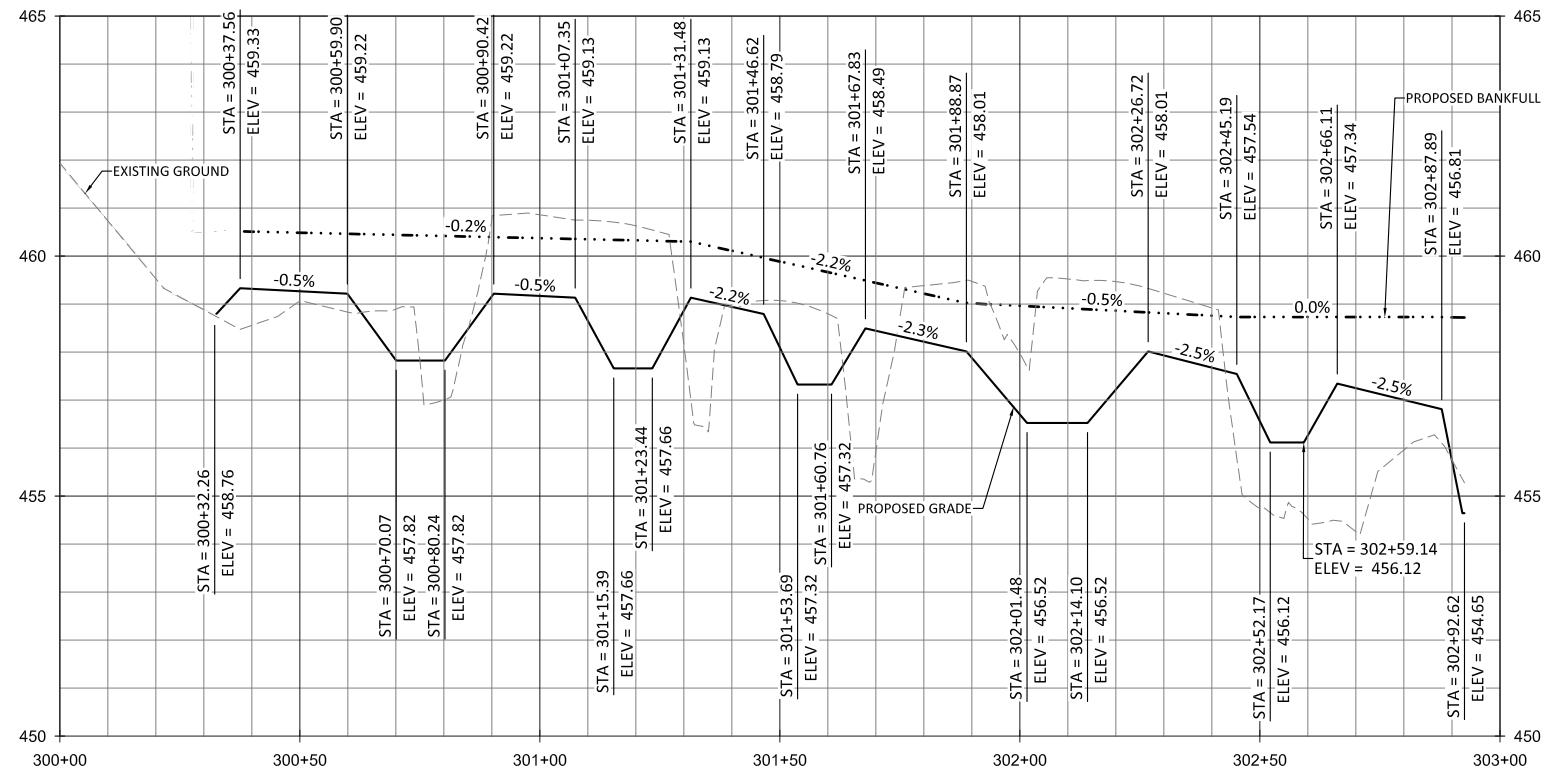
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Chatham County, North Carolina

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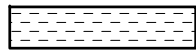
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Streambank Planting Zone					
Live Stakes					
Species	Common Name	Indiv. Spacing	Min. Size	Stratum	% of Stems
<i>Salix nigra</i>	Black Willow	4-7 ft.	0.5"-1.5" cal.	Shrub	15%
<i>Cornus ammomum</i>	Silky Dogwood	3-6 ft.	0.5"-1.5" cal.	Shrub	25%
<i>Salix sericea</i>	Silky Willow	3-6 ft.	0.5"-1.5" cal.	Shrub	30%
<i>Cephalanthus occidentalis</i>	Buttonbush	3-6 ft.	0.5"-1.5" cal.	Shrub	15%
<i>Sambus canadensis</i>	Elderberry	3-6 ft.	0.5"-1.5" cal.	Shrub	15%
					100%
Herbaceous Plugs					
<i>Juncus effusus</i>	Common Rush	4 ft.	1.0"- 2.0" plug	Herbaceous	30%
<i>Carex alata</i>	Broadwing Sedge	4 ft.	1.0"- 2.0" plug	Herbaceous	20%
<i>Panicum virgatum</i>	Switchgrass	4 ft.	1.0"- 2.0" plug	Herbaceous	20%
<i>Scirpus cyperinus</i>	Woolgrass	4 ft.	1.0"- 2.0" plug	Herbaceous	10%
<i>Carex lurida</i>	Lurid Sedge	4 ft.	1.0"- 2.0" plug	Herbaceous	20%
					100%



Buffer Planting Zone					
Bare Roots					
Species	Common Name	Indiv. Spacing	Min. Caliper Size	Stratum	# of Stems
<i>Quercus phellos</i>	Willow Oak	6-12 ft.	0.25"-1.0"	Canopy	15%
<i>Platanus occidentalis</i>	Sycamore	6-12 ft.	0.25"-1.0"	Canopy	20%
<i>Betula nigra</i>	River Birch	6-12 ft.	0.25"-1.0"	Canopy	20%
<i>Quercus michauxii</i>	Swamp Chestnut Oak	6-12 ft.	0.25"-1.0"	Canopy	15%
<i>Quercus nigra</i>	Water Oak	6-12 ft.	0.25"-1.0"	Canopy	8%
<i>Acer negundo</i>	Boxelder	6-12 ft.	0.25"-1.0"	Subcanopy	8%
<i>Ulmus rubra</i>	Slippery Elm	6-12 ft.	0.25"-1.0"	Canopy	8%
<i>Quercus shumardii</i>	Shumard Oak	6-12 ft.	0.25"-1.0"	Canopy	6%
					100%



Priority 1 Floodplain and Wetland Planting Zone					
Bare Roots					
Species	Common Name	Indiv. Spacing	Min. Caliper Size	Stratum	# of Stems
<i>Betula nigra</i>	River Birch	6-12 ft.	0.25"-1.0"	Canopy	20%
<i>Quercus pagoda</i>	Cherrybark Oak	6-12 ft.	0.25"-1.0"	Canopy	10%
<i>Platanus occidentalis</i>	Sycamore	6-12 ft.	0.25"-1.0"	Canopy	15%
<i>Quercus michauxii</i>	Swamp Chestnut Oak	6-12 ft.	0.25"-1.0"	Canopy	15%
<i>Salix nigra</i>	Black Willow	6-12 ft.	0.25"-1.0"	Canopy	5%
<i>Quercus phellos</i>	Willow Oak	6-12 ft.	0.25"-1.0"	Canopy	10%
<i>Quercus nigra</i>	Water Oak	6-12 ft.	0.25"-1.0"	Canopy	5%
<i>Celtis laevigata</i>	Sugarberry	6-12 ft.	0.25"-1.0"	Canopy	5%
<i>Acer negundo</i>	Boxelder	6-12 ft.	0.25"-1.0"	Subcanopy	5%
<i>Ulmus rubra</i>	Slippery Elm	6-12 ft.	0.25"-1.0"	Canopy	5%
<i>Diospyros virginiana</i>	Persimmon	6-12 ft.	0.25"-1.0"	Canopy	5%
					100%

Permanent Riparian Seeding					
Pure Live Seed (20 lbs/acre)					
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)	Percentage
All Year	<i>Panicum rigidulum</i>	Redtop Panicgrass	Herbaceous	1.0	5%
All Year	<i>Chasmanthium latifolium</i>	River Oats	Herbaceous	2.0	10%
All Year	<i>Rudbeckia hirta</i>	Blackeyed Susan	Herbaceous	1.0	5%
All Year	<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	Herbaceous	1.0	5%
All Year	<i>Carex vulpinoidea</i>	Fox Sedge	Herbaceous	3.0	15%
All Year	<i>Carex lurida</i>	Lurid Sedge	Herbaceous	1.0	5%
All Year	<i>Panicum clandestinum</i>	Deertongue	Herbaceous	3.0	15%
All Year	<i>Elymus virginicus</i>	Virginia Wild Rye	Herbaceous	3.0	15%
All Year	<i>Chamaecrista fasciculata var. fasciculata</i>	Partridge Pea	Herbaceous	1.0	5%
All Year	<i>Asclepias incarnata</i>	Swamp Milkweed	Herbaceous	0.2	1%
All Year	<i>Juncus effusus</i>	Soft Rush	Herbaceous	2.0	10%
All Year	<i>Bidens aristosa</i>	Bur Marigold	Herbaceous	0.8	4%
All Year	<i>Helianthus angustifolius</i>	Swamp Sunflower	Herbaceous	1.0	5%
					100%

Temporary Seeding					
Pure Live Seed					
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)	
Aug 15 - May 1	<i>Secale cereale</i>	Rye Grain	Herbaceous	140	
May 1 - Aug 15	<i>Setaria italica</i>	German Millet	Herbaceous	50	

Permanent Seeding Outside Easement					
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)	Percentage
All Year	<i>Festuca arundinacea</i>	Tall Fescue	Herbaceous	40	70%
All Year	<i>Festuca rubra</i>	Creeping Red Fescue	Herbaceous	40	10%
All Year	<i>Dactylis glomerata</i>	Orchardgrass	Herbaceous	40	20%
					100%

- Zone 1 - Streambank Planting Zone (See Detail 2, Sheet 5.10)
- Zone 2 - Buffer Planting Zone (See Detail 1, Sheet 5.10)
- Zone 3 - Wetland Planting Zone (See Detail 1, Sheet 5.10)



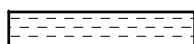
Note: Non-hatched areas within the conservation easement are currently vegetated and will be planted as needed to achieve target density. Buffer planting will occur within the Limits of Disturbance

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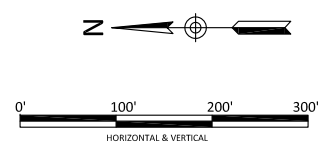
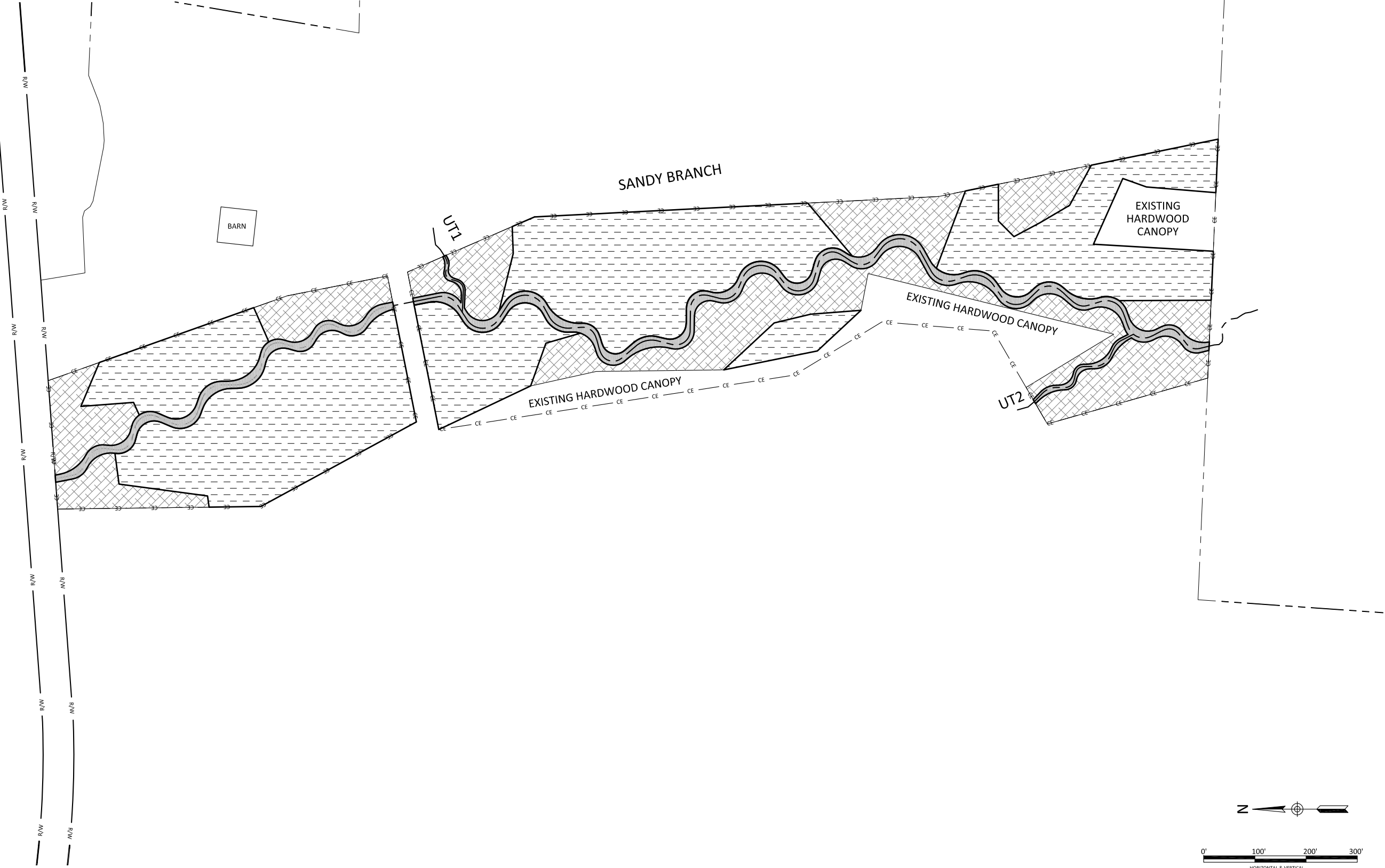
Planting Tables

Revisions:

-  Zone 1 - Streambank Planting Zone
(See Detail 2, Sheet 5.10)
-  Zone 2 - Buffer Planting Zone
(See Detail 1, Sheet 5.10)
-  Zone 3 - Wetland Planting Zone
(See Detail 1, Sheet 5.10)

Note: Non-hatched areas within the conservation easement are currently vegetated and will be planted as needed to achieve target density. Buffer planting will occur within the Limits of Disturbance

ELMER MOORE RD (S.R. 2126)
60' R/W



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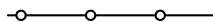
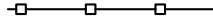

Planting Plan

Revisions:

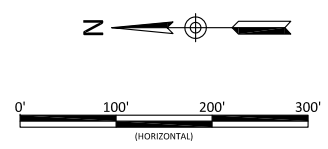
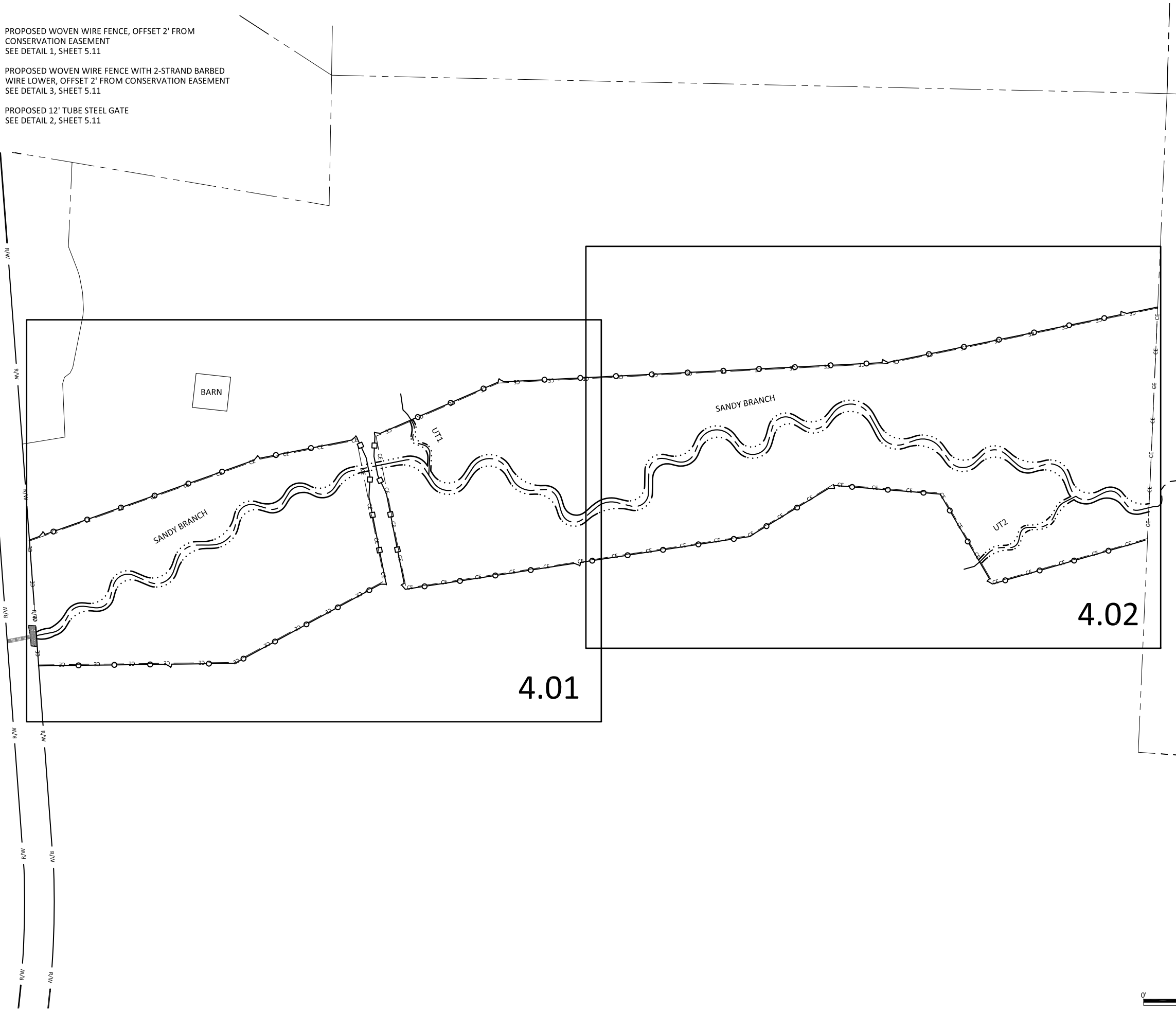
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-  PROPOSED WOVEN WIRE FENCE, OFFSET 2' FROM CONSERVATION EASEMENT
SEE DETAIL 1, SHEET 5.11
-  PROPOSED WOVEN WIRE FENCE WITH 2-STRAND BARBED WIRE LOWER, OFFSET 2' FROM CONSERVATION EASEMENT
SEE DETAIL 3, SHEET 5.11
-  PROPOSED 12' TUBE STEEL GATE
SEE DETAIL 2, SHEET 5.11

ELMER MOORE RD (S.R. 2126)
60' R/W



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Fencing Plan Overview

Revisions:

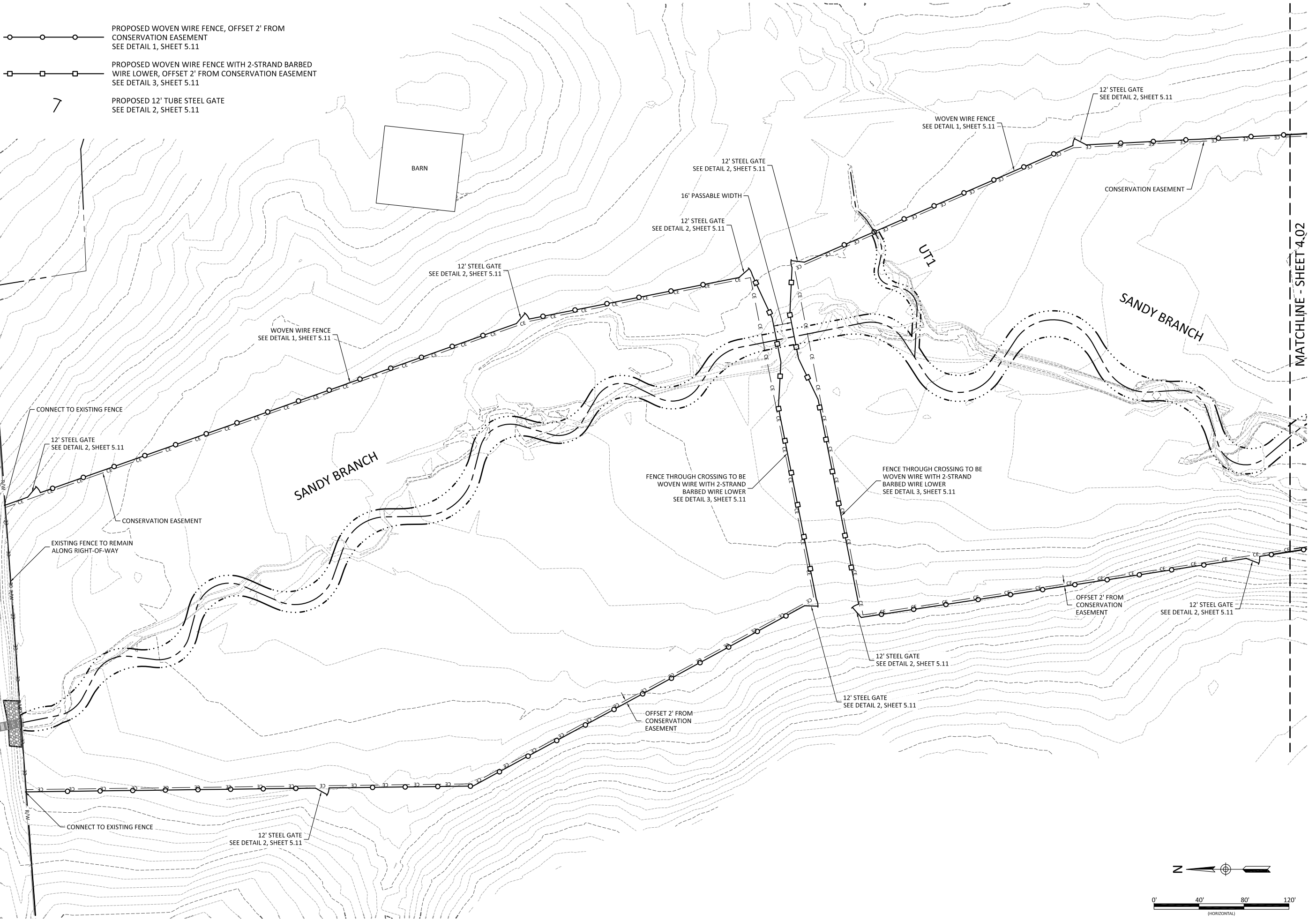
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Job Number: 005-02173
Project Engineer: GAT
Drawn By: CAW
Checked By: ANA

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Sheet

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- ○ ○ PROPOSED WOVEN WIRE FENCE, OFFSET 2' FROM CONSERVATION EASEMENT SEE DETAIL 1, SHEET 5.11
- □ □ PROPOSED WOVEN WIRE FENCE WITH 2-STRAND BARBED WIRE LOWER, OFFSET 2' FROM CONSERVATION EASEMENT SEE DETAIL 3, SHEET 5.11
- 7 PROPOSED 12' TUBE STEEL GATE SEE DETAIL 2, SHEET 5.11



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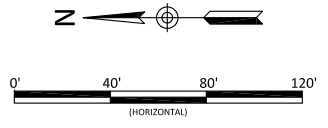
Fencing Plan

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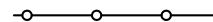
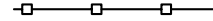

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Job Number:	005-02173
Project Engineer:	GAT
Drawn By:	CAW
Checked By:	ANA

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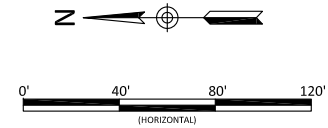
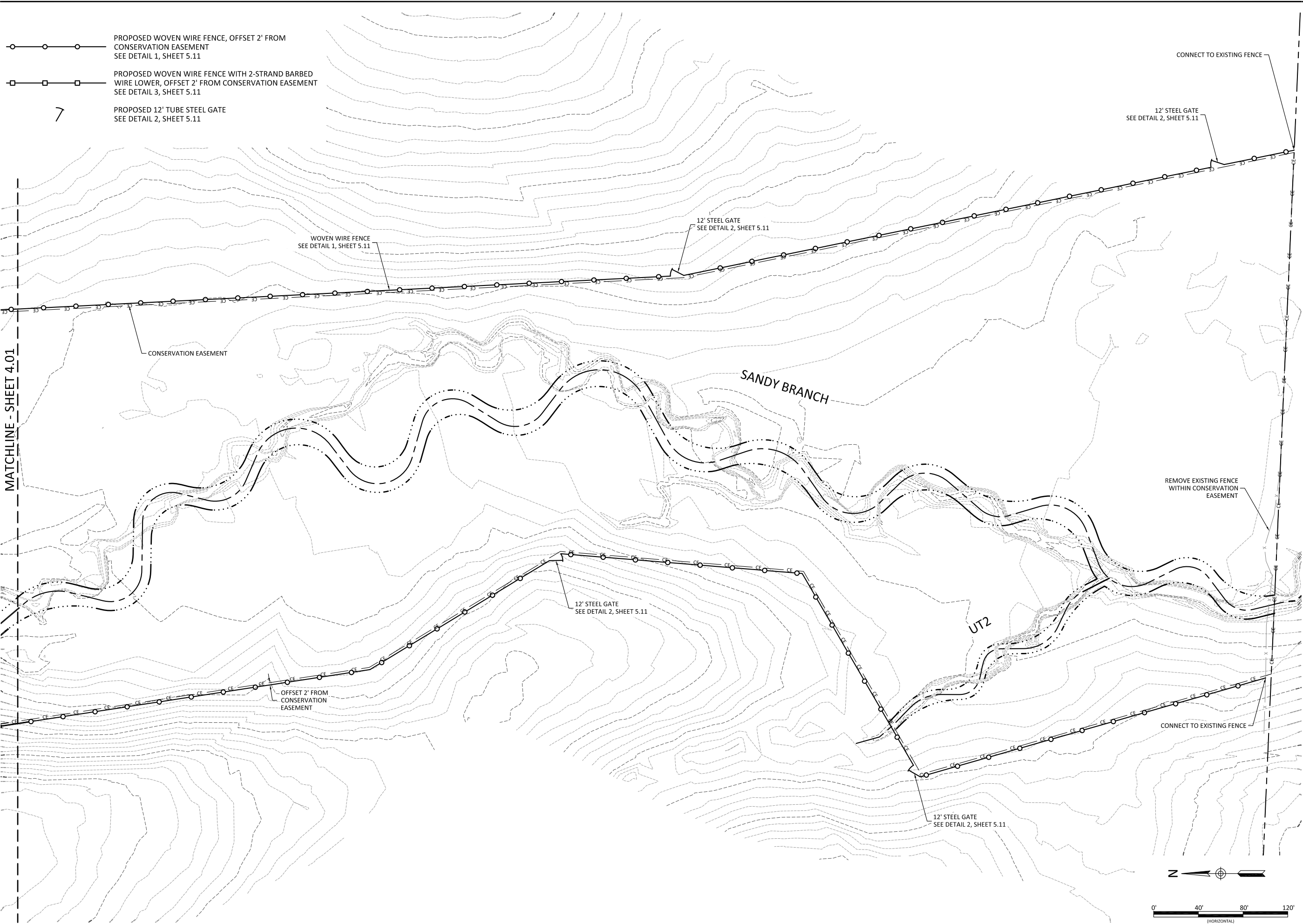
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-  PROPOSED WOVEN WIRE FENCE, OFFSET 2' FROM CONSERVATION EASEMENT SEE DETAIL 1, SHEET 5.11
-  PROPOSED WOVEN WIRE FENCE WITH 2-STRAND BARBED WIRE LOWER, OFFSET 2' FROM CONSERVATION EASEMENT SEE DETAIL 3, SHEET 5.11
-  PROPOSED 12' TUBE STEEL GATE SEE DETAIL 2, SHEET 5.11

MATCHLINE - SHEET 4.01



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Fencing Plan

Revisions:

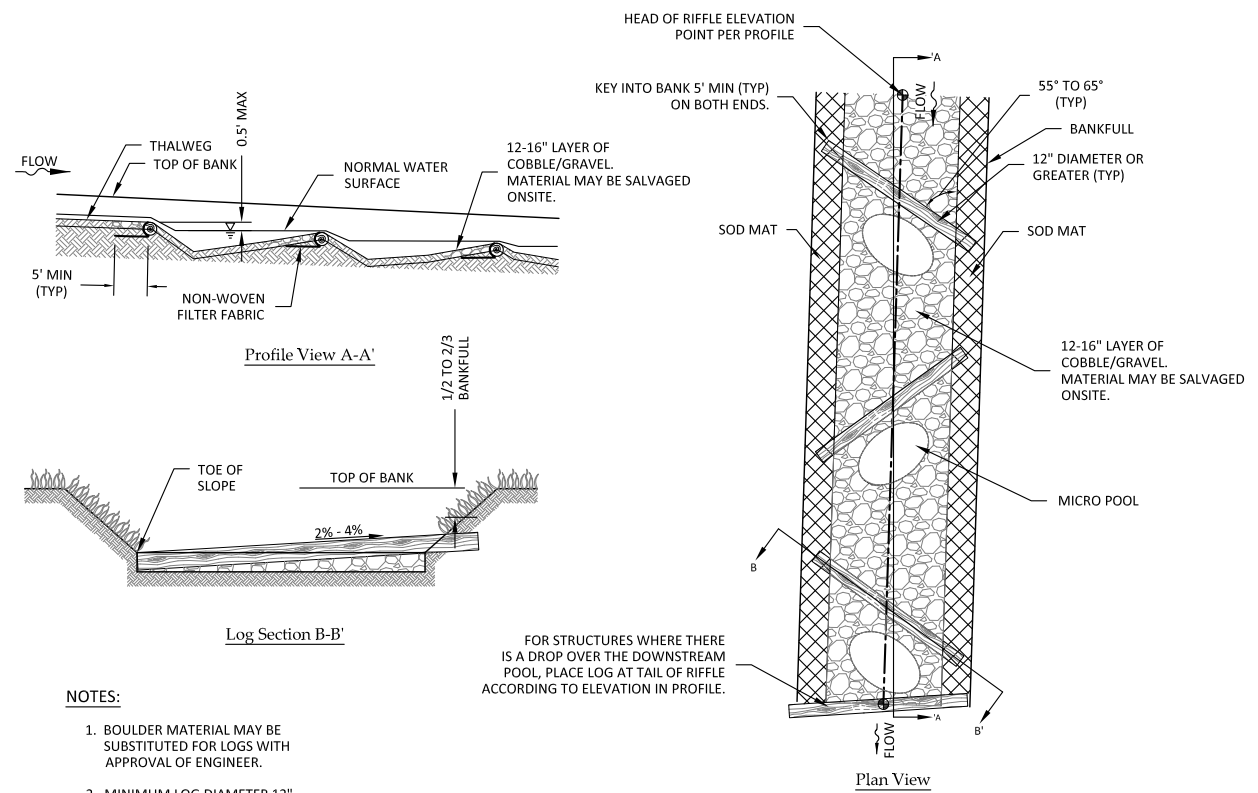
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Job Number: 005-02173
Project Engineer: GAT
Drawn By: CAW
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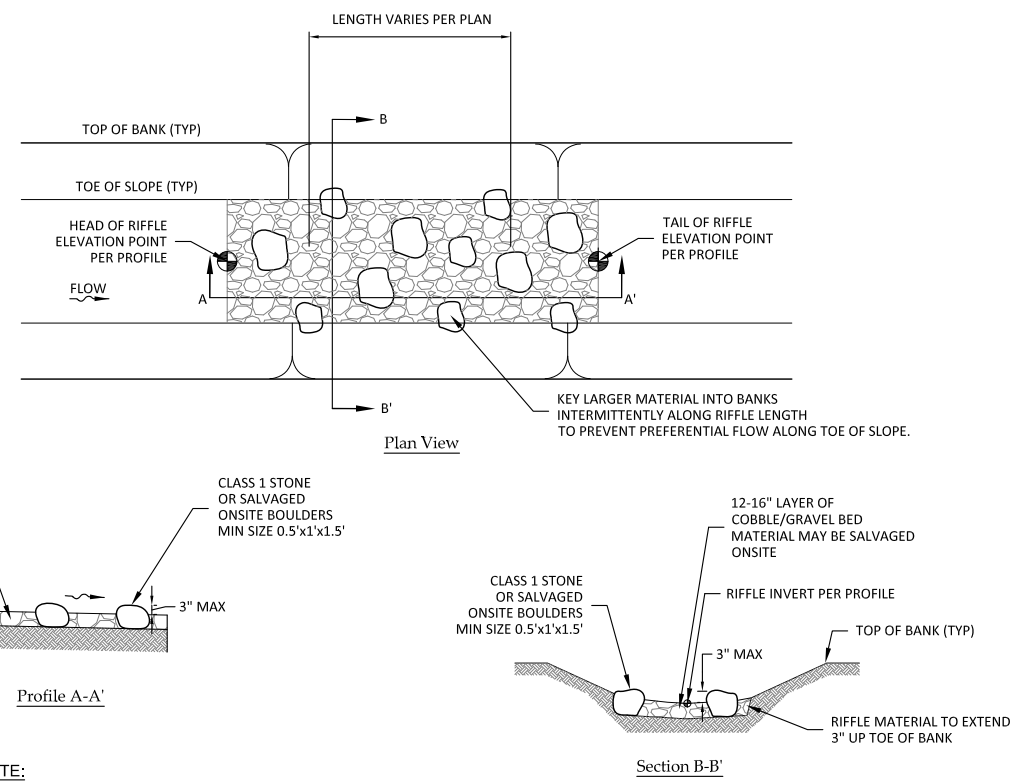
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- NOTES:**
1. BOULDER MATERIAL MAY BE SUBSTITUTED FOR LOGS WITH APPROVAL OF ENGINEER.
 2. MINIMUM LOG DIAMETER 12".
 3. MINIMUM ONE LOG PER 10 LF OF RIFFLE LENGTH OR ONE LOG PER 0.3' OF DROP, WHICHEVER IS LESSER.

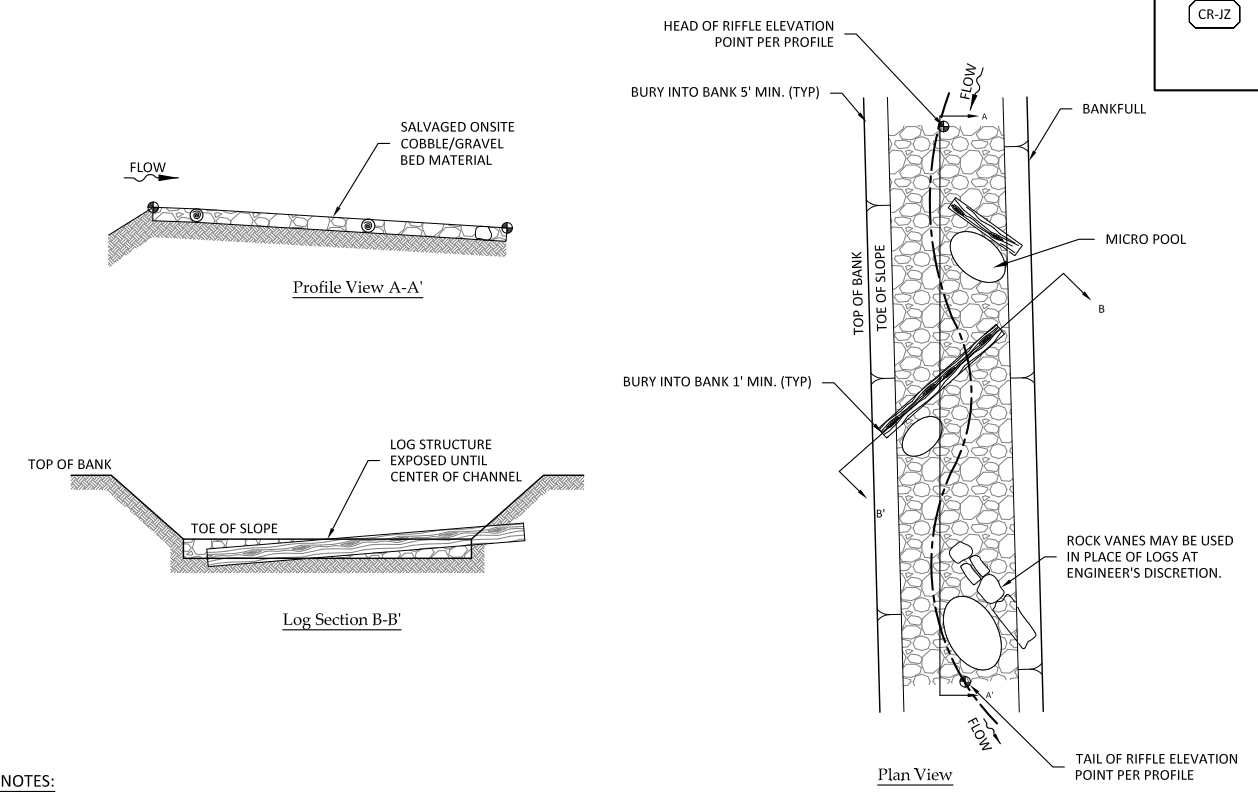
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5.01 **Angled Log Riffle**
Not to Scale

CR-ALR		CR-CH	
CR-JZ		CR-NM	



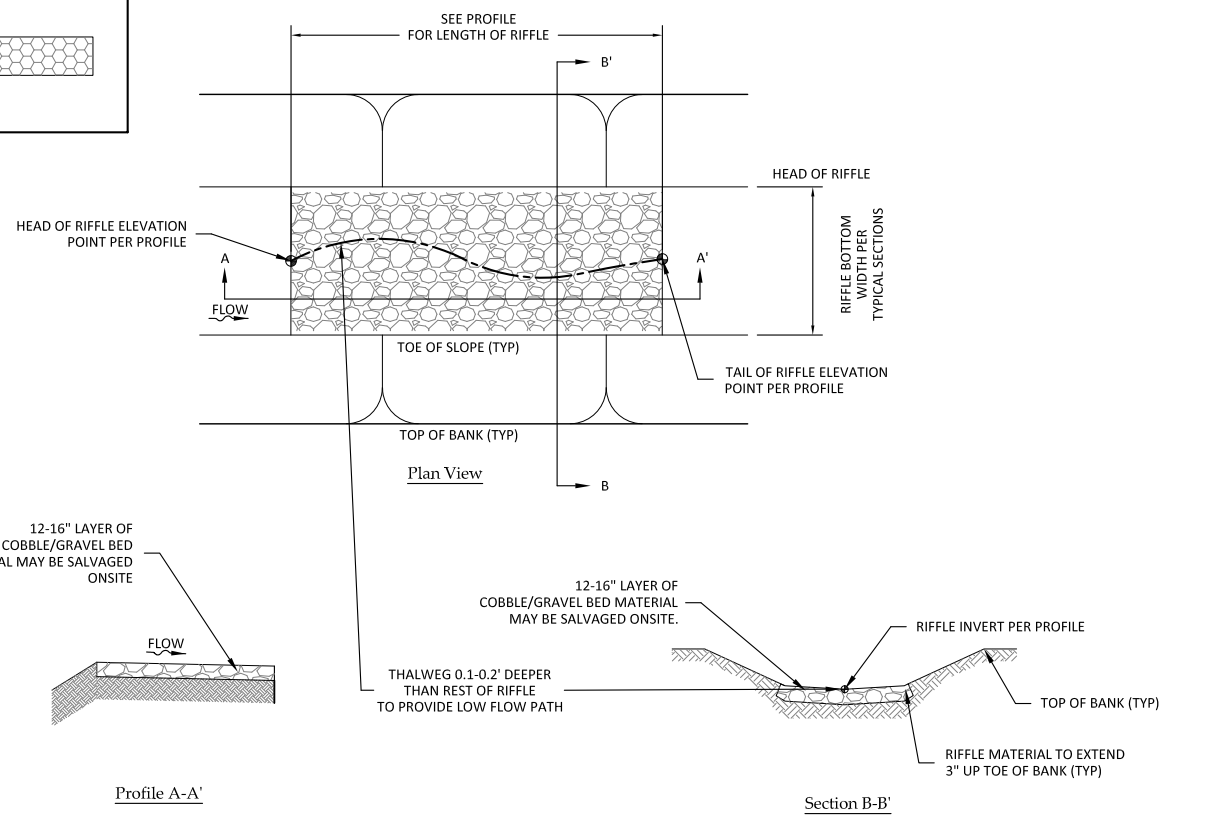
NOTE:
CHUNKY MATERIAL ELEVATION SHALL BE 0-8" ABOVE RIFFLE MATERIAL BASED ON ENGINEER'S DISCRETION.

2
5.01 **Chunky Riffle**
Not to Scale



- NOTES:**
1. STRUCTURES SHOULD VARY IN SIZE AND TYPE WITHIN EACH RIFFLE.
 2. ROCK MAY BE SUBSTITUTED FOR LOGS AT ENGINEER'S DISCRETION.

3
5.01 **Jazz Riffle Structure**
Not to Scale



NOTE:
IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED FOR QUARRY ROCK OF SIMILAR SIZE.

4
5.01 **Native Material Constructed Riffle**
Not to Scale

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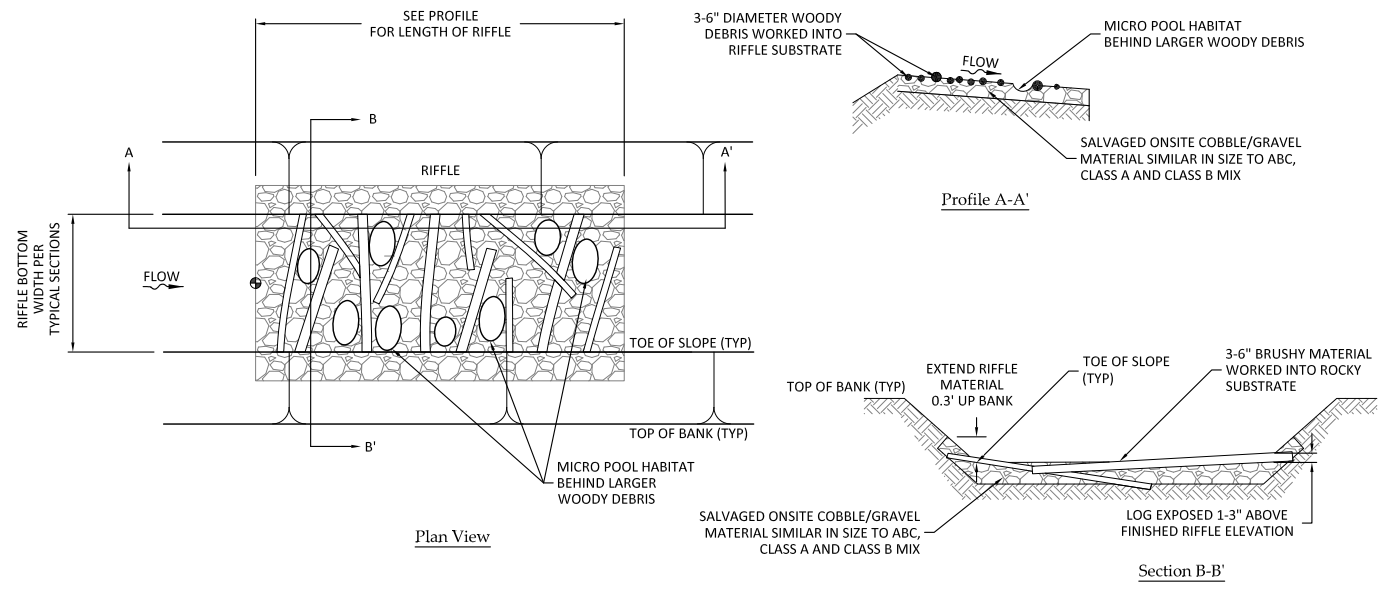
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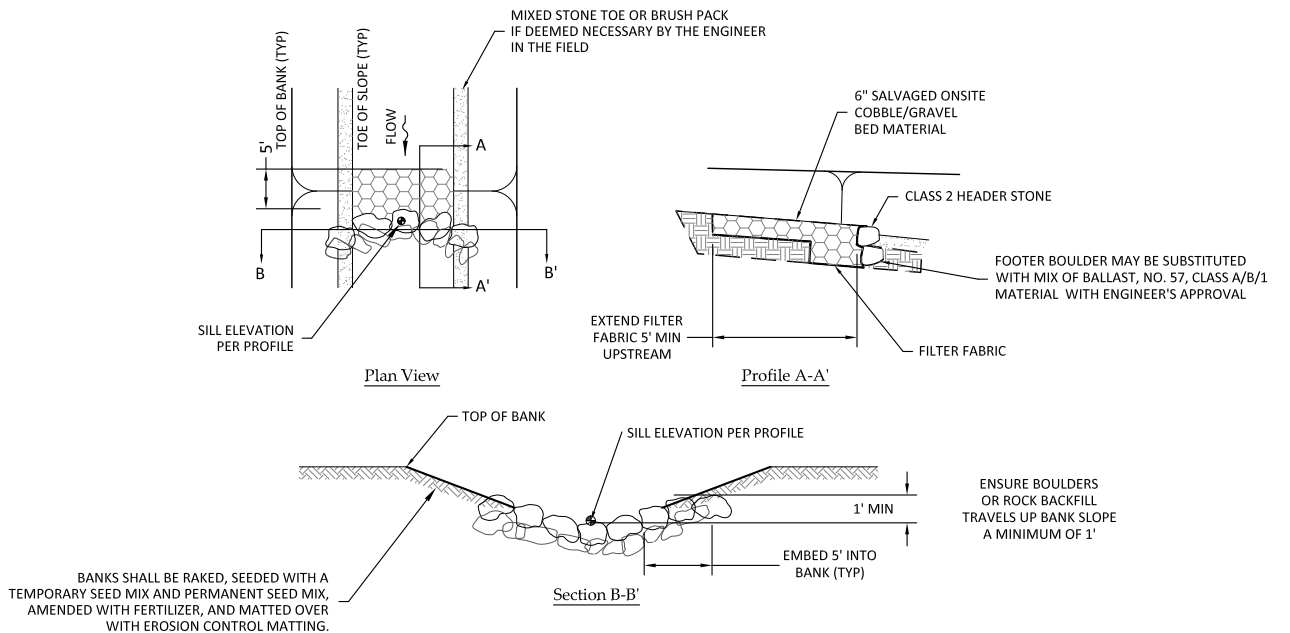
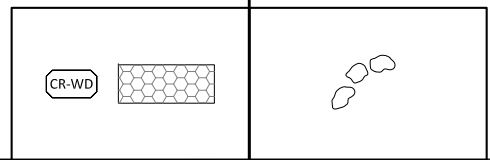
5.01

Sheet



- NOTES:**
1. WOOD SHALL COMPRISE 20% TO 50% OF THE RIFFLE SURFACE AREA.
 2. WOODY MATERIAL SHOULD NOT PROTRUDE GREATER THAN 3" ABOVE RIFFLE BED.
 3. IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED WITH QUARRY ROCK OF SIMILAR SIZE.
 4. WOOD SHOULD BE PLACED PREDOMINANTLY PERPENDICULAR TO CHANNEL.
 5. ANY MATERIAL GREATER THAN 1" DIAMETER THAT IS NOT PERPENDICULAR TO THE CHANNEL SHALL BE INSTALLED SUCH THAT THE EXPOSED END IS POINTING DOWNSTREAM.

1
5.02 **Woody Riffle**
Not to Scale



2
5.02 **Boulder Sill**
Not to Scale

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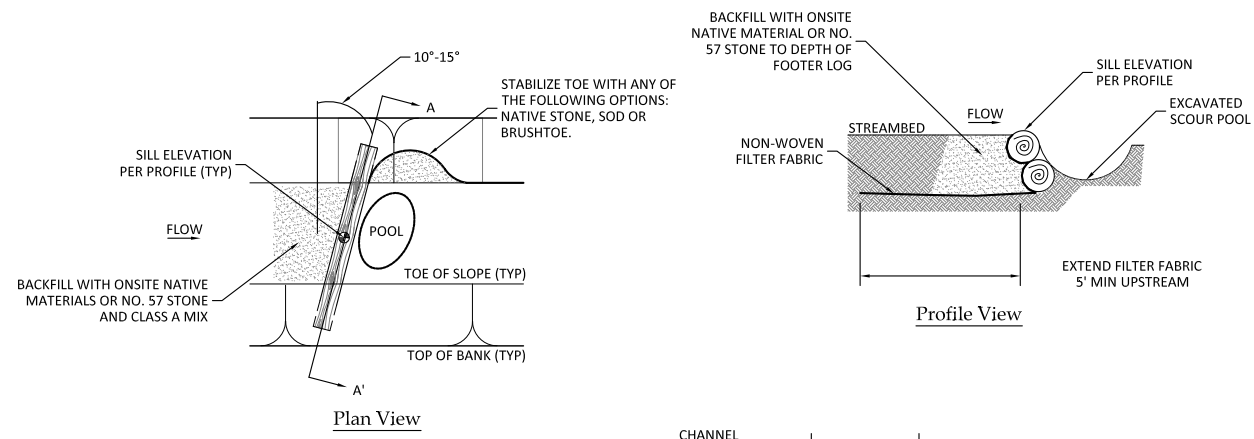
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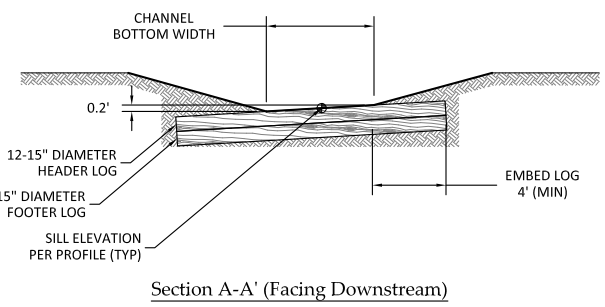
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Job Number: 005-02173
Project Engineer: GAT
Drawn By: CAW
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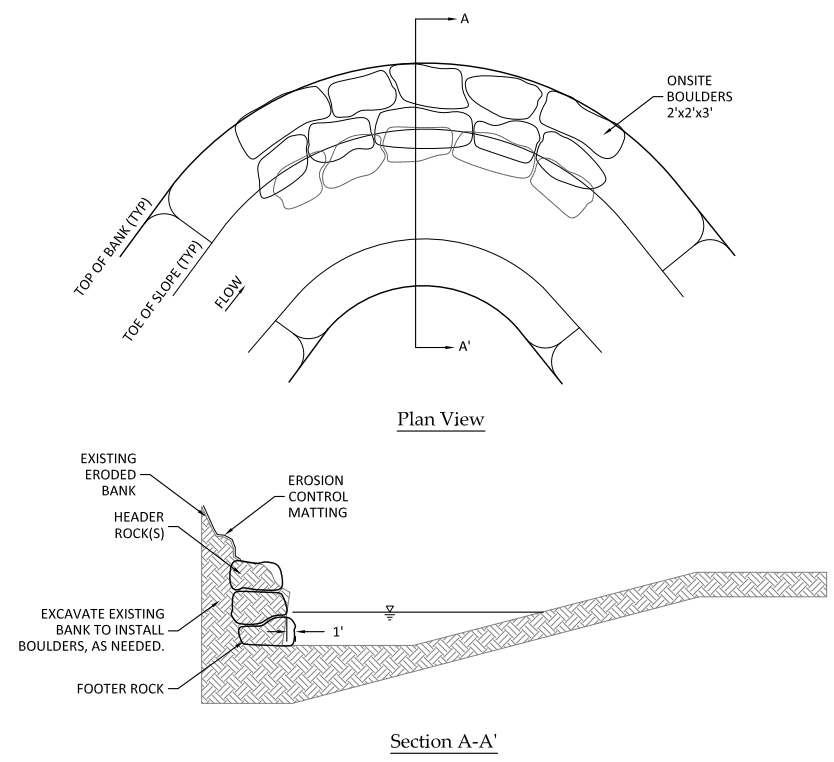
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1
5.03 **Angled Log Sill**
Not to Scale

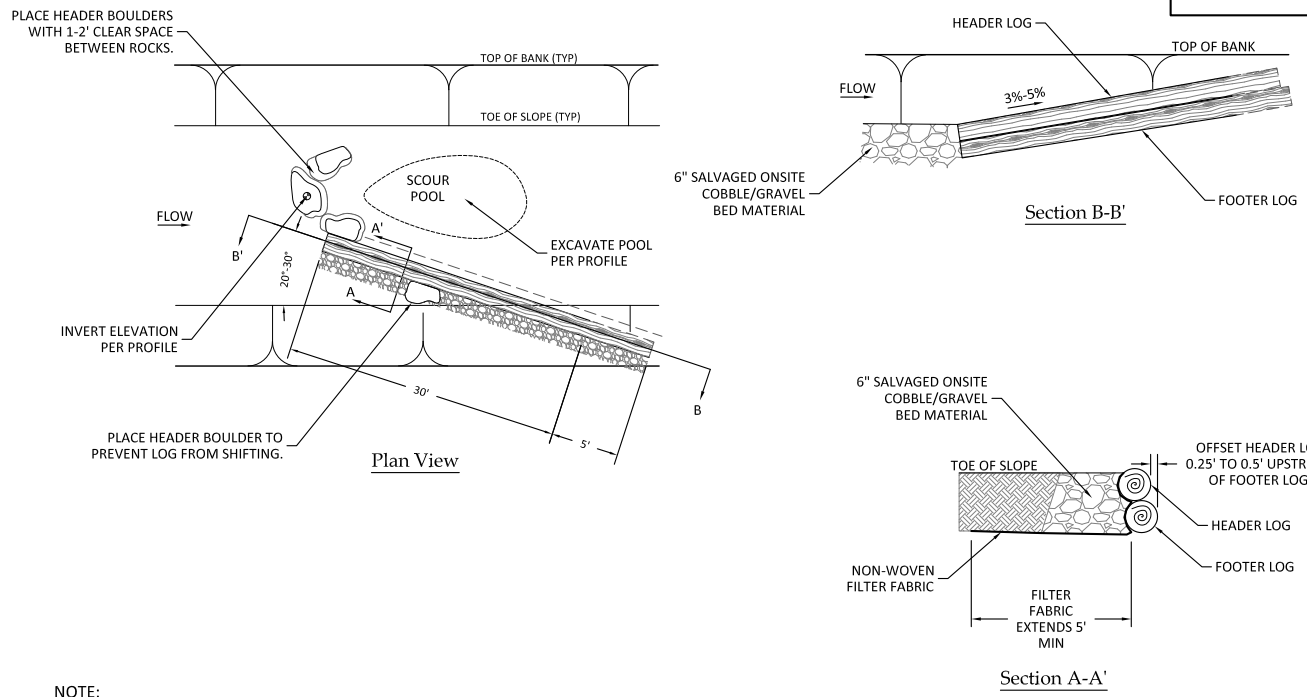
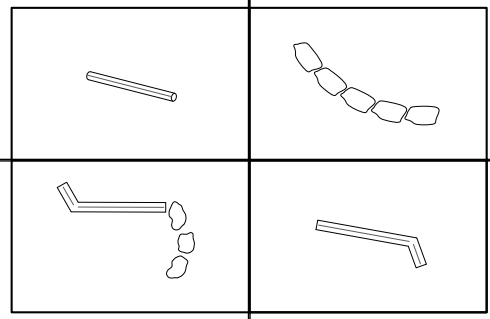


2
5.03 **Boulder Toe Protection**
Not to Scale



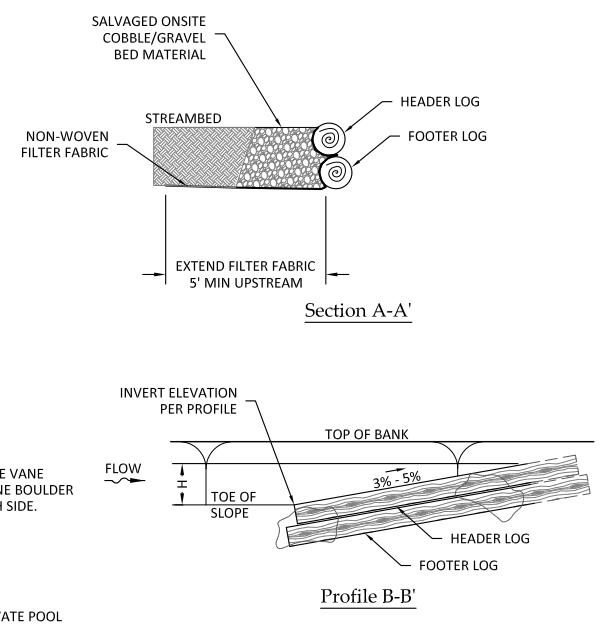
4
5.03 **Log Vane**
Not to Scale

NOTE:
FOOTER LOG NOT NEEDED FOR LOGS 24" OR GREATER ON SANDY BRANCH AND 18" OR GREATER UT1 AND UT2.



3
5.03 **Log J-Hook**
Not to Scale

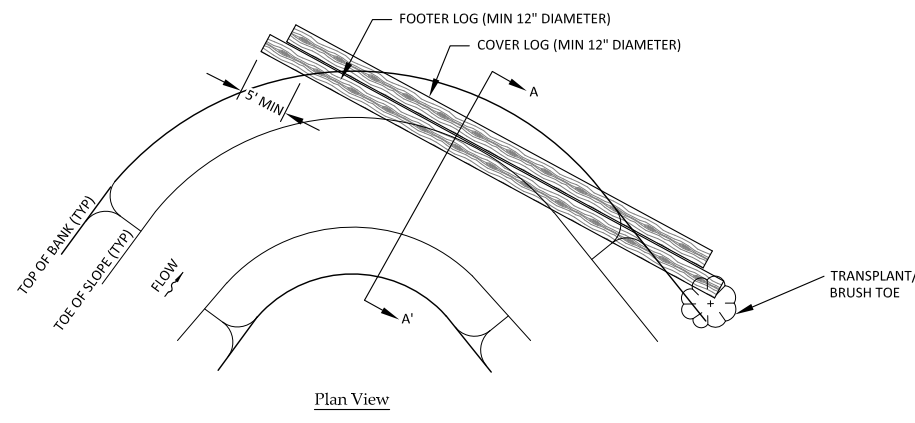
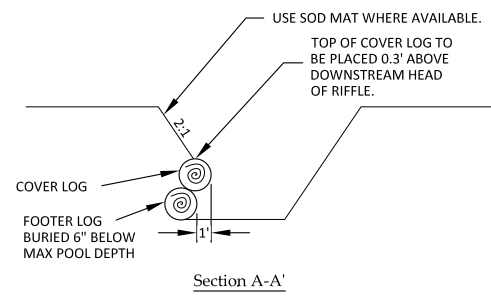
NOTE:
ON UT1 AND UT2, STABILIZATION BOULDER MAY BE REMOVED AT ENGINEER'S DISCRETION.



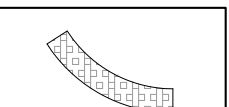
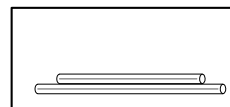
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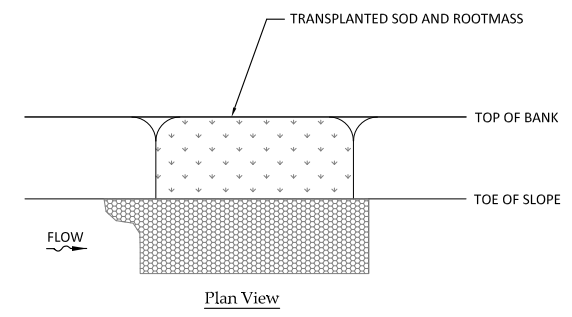
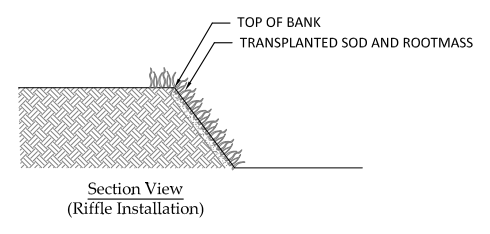
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1
5.04 Lunker Log
Not to Scale



2
5.04 Transplanted Sod Mat
Not to Scale



NOTES:

1. PREPARE THE BANK WHERE THE SOD MAT WILL BE TRANSPLANTED BY RAKING.
2. EXCAVATE TRANSPLANT SOD MATS WITH A WIDE BUCKET AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE.
3. PLACE TRANSPLANT ON THE BANK TO BE STABILIZED (SOD MAT ONLY TO BE TOUCHED ONCE).
4. SECURE WITH SOD STAPLES.
5. FILL IN ANY HOLES AROUND THE TRANSPLANT AND COMPACT.
6. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
7. PLACE MULTIPLE TRANSPLANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.
8. INSTALL EROSION CONTROL MATTING ABOVE TRANSPLANTED SOD MATS.

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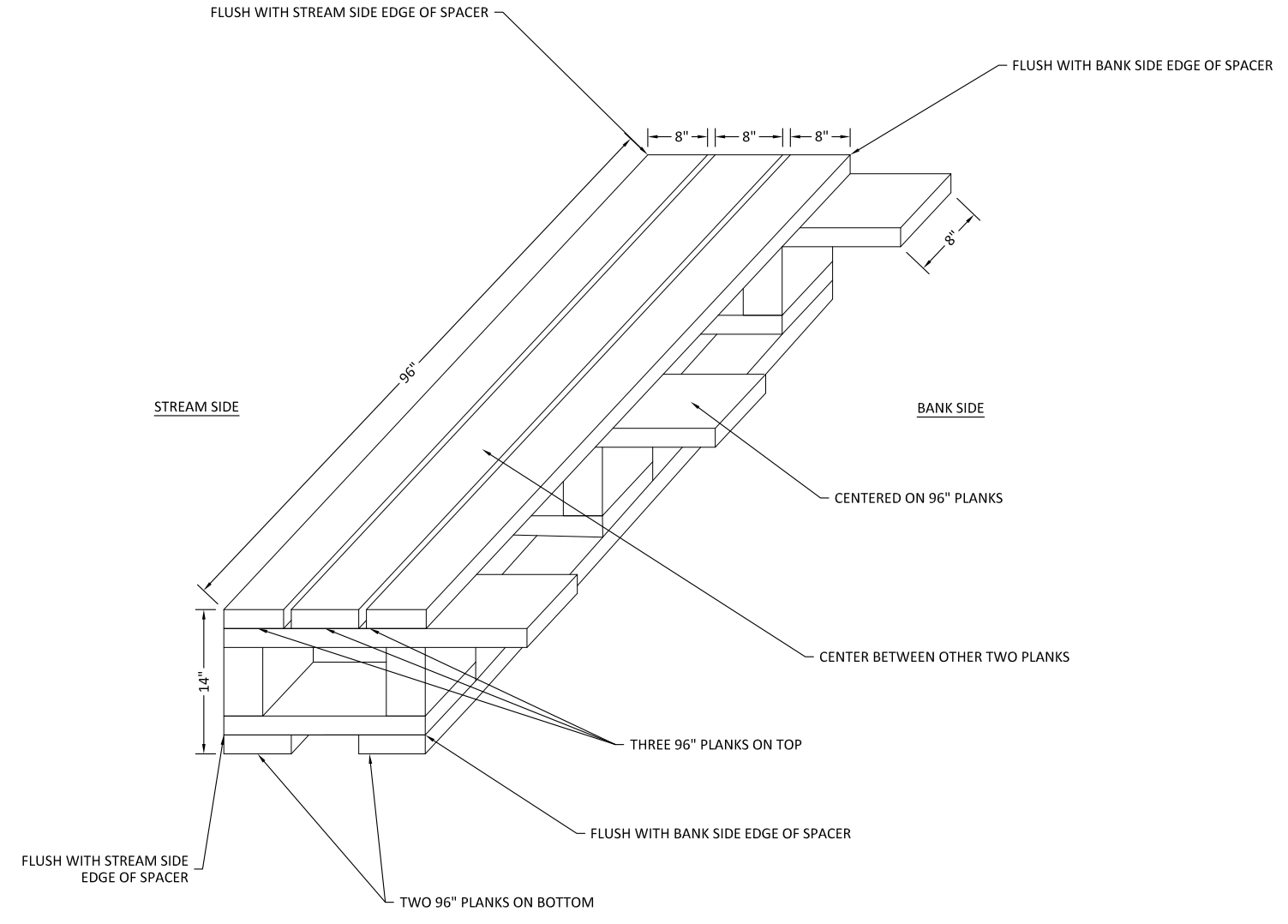
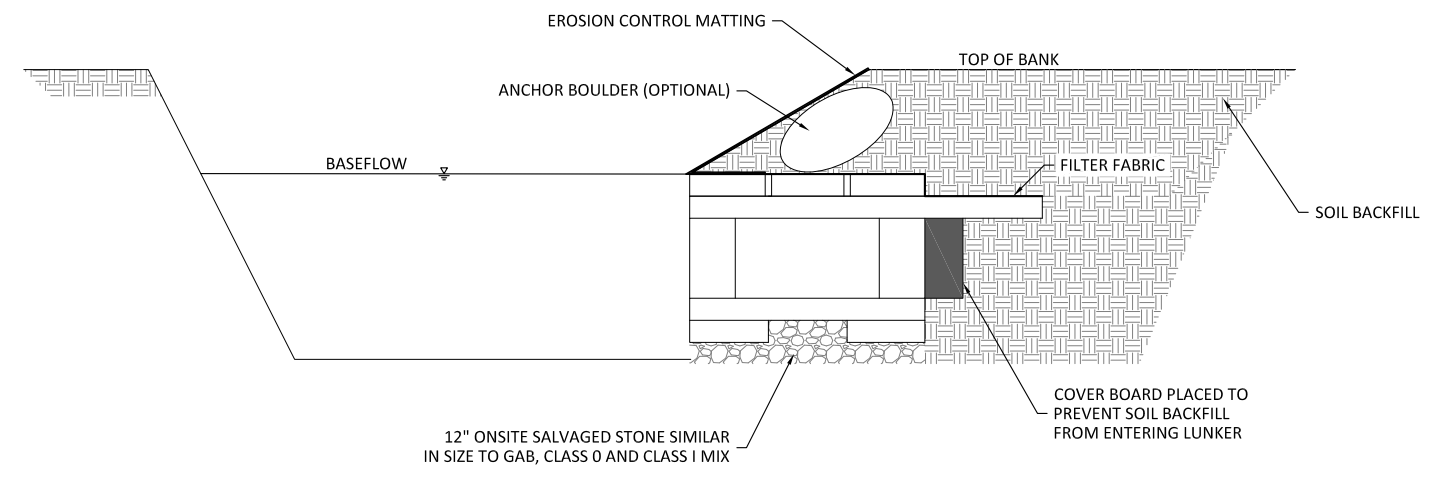
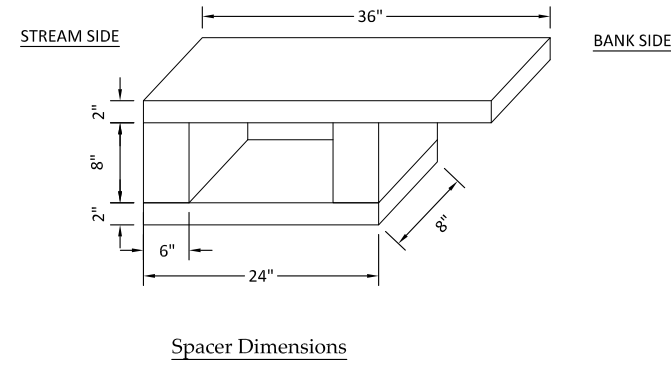
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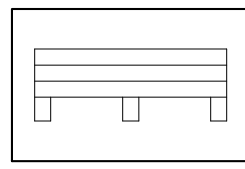
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- NOTES:**
- DIMENSIONS REPRESENT NOMINAL LUMBER SIZES.
 - SPACERS SHOULD BE EQUAL IN SIZE AND BUILT USING OAK OR OTHER STRONG AND ROT-RESISTANT WOOD APPROVED BY ENGINEER.
 - MINIMUM 20D NAILS SHOULD BE USED TO BUILD SPACERS AND SECURE PLANKS.
 - THREE LUNKER STRUCTURES SHALL BE BUILT AND USED IN SEQUENCE WHEN SPECIFIED IN PLANS.

- CONSTRUCTION SEQUENCE:**
- BUILD THREE EQUAL-SIZED SPACERS. THE TOP PIECE MUST BE 50 PERCENT LONGER THAN THE BOTTOM PIECE. SECURE ALL BLOCKS WITH TWO OR THREE NAILS.
 - FORM THE BOTTOM OF THE LUNKER USING TWO 96" PLANKS. THE SPACERS SHOULD BE PLACED AT EACH END AND AT THE MIDPOINT OF THE PLANKS AND SHOULD BE SECURED WITH NAILS ABOVE THE RECTANGULAR BLOCKS.
 - FORM THE TOP OF THE LUNKER USING THREE 96" PLANKS, EQUALLY SPACED. IGNORE THE OVERHANG WHEN SPACING THE PLANKS. SECURE PLANKS WITH NAILS.
 - INSTALL THE COVER BOARD ON THE BANK SIDE, COVERING THE OPENINGS UNDER THE OVERHANG.
 - EXCAVATE A TRENCH AT THE TOE OF THE SLOPE INTO THE BED AND BANK AT LOCATION OF LUNKER (SPECIFIED IN PLANS).
 - PLACE 12" OF ONSITE SALVAGED STONE AS BASE FOR LUNKER.
 - IF NECESSARY, ANCHOR THE LUNKER INTO THE STREAMBED WITH LARGE BOULDERS (MINIMUM 24"). ALTERNATIVELY, DRILL $\frac{3}{16}$ " HOLES AND INSERT 4' STEEL REBAR EVERY 4' TO STABILIZE THE STRUCTURE.

Lunker Structure
 1/5.05 Not to Scale



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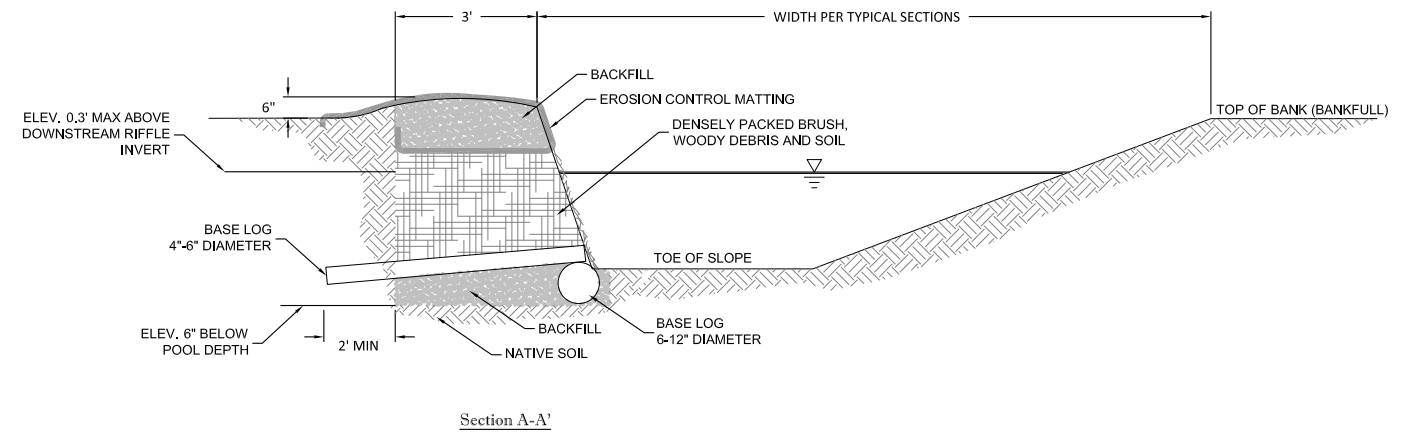
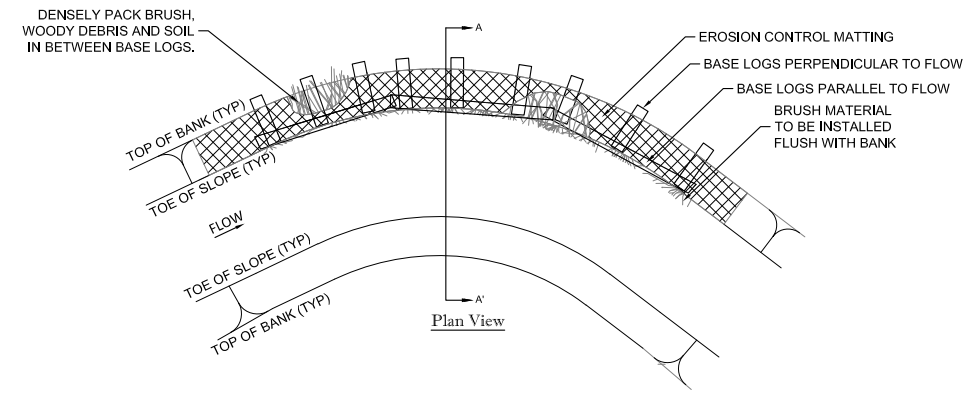
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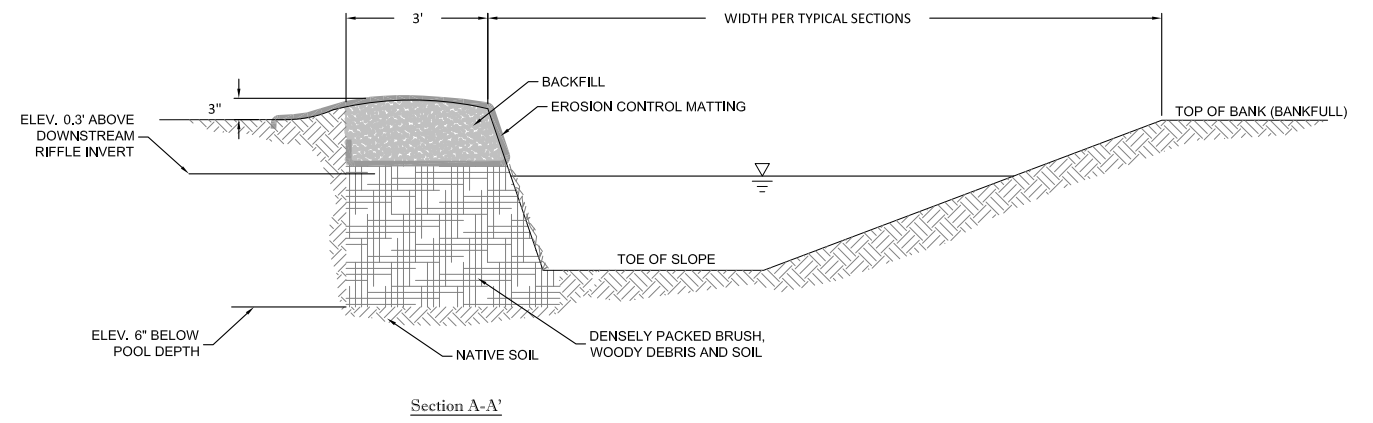
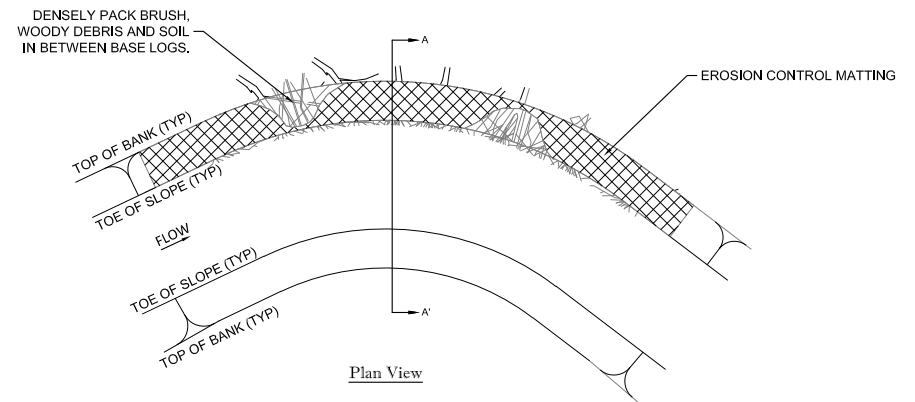
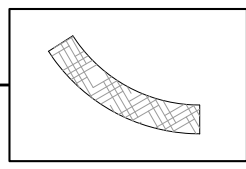
5.05

Sheet



- NOTES:
1. OVEREXCAVATE 3' MIN OUTSIDE OF TOP OF BANK (BANKFULL).
 2. INSTALL BASE LOGS PARALLEL TO FLOW AT TOE OF SLOPE. DIAMETER 6-12".
 3. INSTALL BASE LOGS PERPENDICULAR TO FLOW AT INTERVALS ALONG BANK, RESTING ON TOP OF PARALLEL BASE LOGS. BASE LOGS SHALL BE 6-12" DIAMETER.
 4. INSTALL A DENSE LAYER OF BRUSH/WOODY DEBRIS, WHICH SHALL CONSIST OF SMALL BRANCHES AND ROOTS COLLECTED ONSITE AND SOIL TO FILL ANY VOID SPACE. LIGHTLY COMPACT BRUSH/WOODY DEBRIS LAYER.
 5. BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
 6. INSTALL MATTING OVER BRUSH/WOODY DEBRIS.
 7. INSTALL EARTH BACKFILL OVER BRUSH/WOODY LAYER ACCORDING TO TYPICAL SECTION DIMENSIONS.
 8. SEED, MULCH, AND INSTALL EROSION CONTROL MATTING AND BANK STABILIZATION PER PLANS.
 9. SOD MAT MAY BE PLACED ON TOP OF BRUSH IF AVAILABLE.

1 Brush Toe - Sandy Branch
5.06 Not to Scale



- NOTES:
1. OVEREXCAVATE 3' OUTSIDE OF TOP OF BANK (BANKFULL).
 2. INSTALL A DENSE LAYER OF BRUSH/WOODY DEBRIS, WHICH SHALL CONSIST OF SMALL BRANCHES AND ROOTS COLLECTED ONSITE AND SOIL TO FILL ANY VOID SPACE. LIGHTLY COMPACT BRUSH/WOODY DEBRIS LAYER.
 3. BRUSH SHOULD BE ALIGNED SO STEMS ARE ROUGHLY PARALLEL AND IS INSTALLED POINTING SLIGHTLY UPSTREAM.
 4. INSTALL MATTING OVER BRUSH/WOODY DEBRIS.
 5. INSTALL EARTH BACKFILL OVER BRUSH/WOODY LAYER ACCORDING TO TYPICAL SECTION DIMENSIONS.
 6. SEED, MULCH, AND INSTALL EROSION CONTROL MATTING AND BANK STABILIZATION PER PLANS.
 7. SOD MAT MAY BE PLACED ON TOP OF BRUSH IF AVAILABLE.

2 Brush Toe - UT1 & UT2
5.06 Not to Scale

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

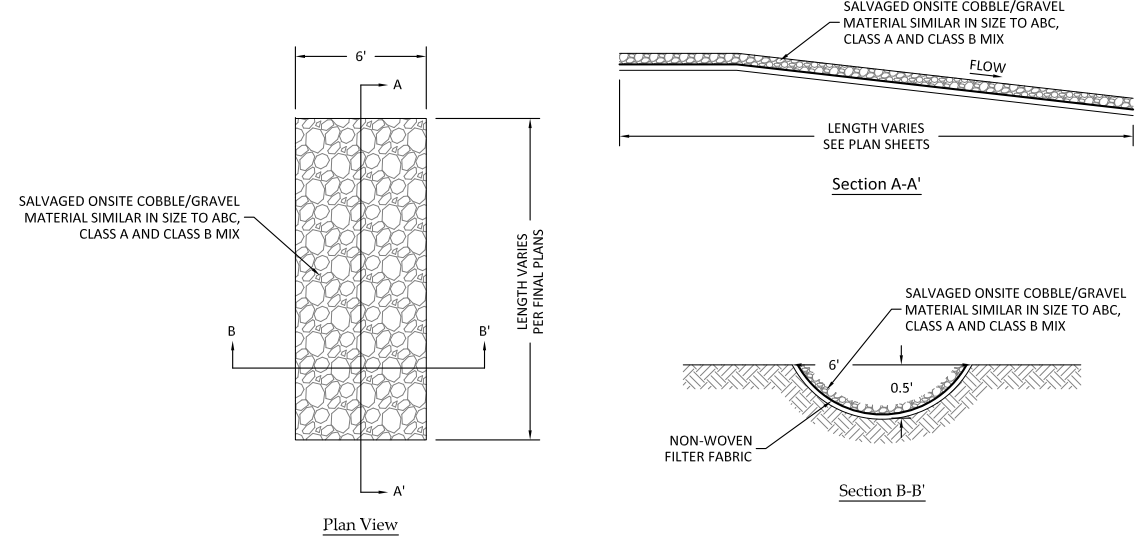
Sandy Branch Mitigation Site
Chatham County, North Carolina

Details

Revisions:

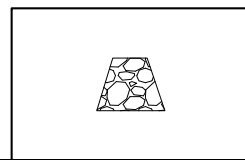
Date: 12.12.2019
Job Number: 005-02173
Project Engineer: GAT
Drawn By: CAW
Checked By: ANA

5.06



NOTE:
 IF NECESSARY, SALVAGED ONSITE ROCK MAY BE SUBSTITUTED FOR QUARRY ROCK OF SIMILAR SIZE.

1
5.07 Rock Floodplain Outlet
 Not to Scale



PRELIMINARY
 DO NOT
 USE FOR
 CONSTRUCTION

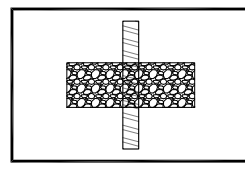
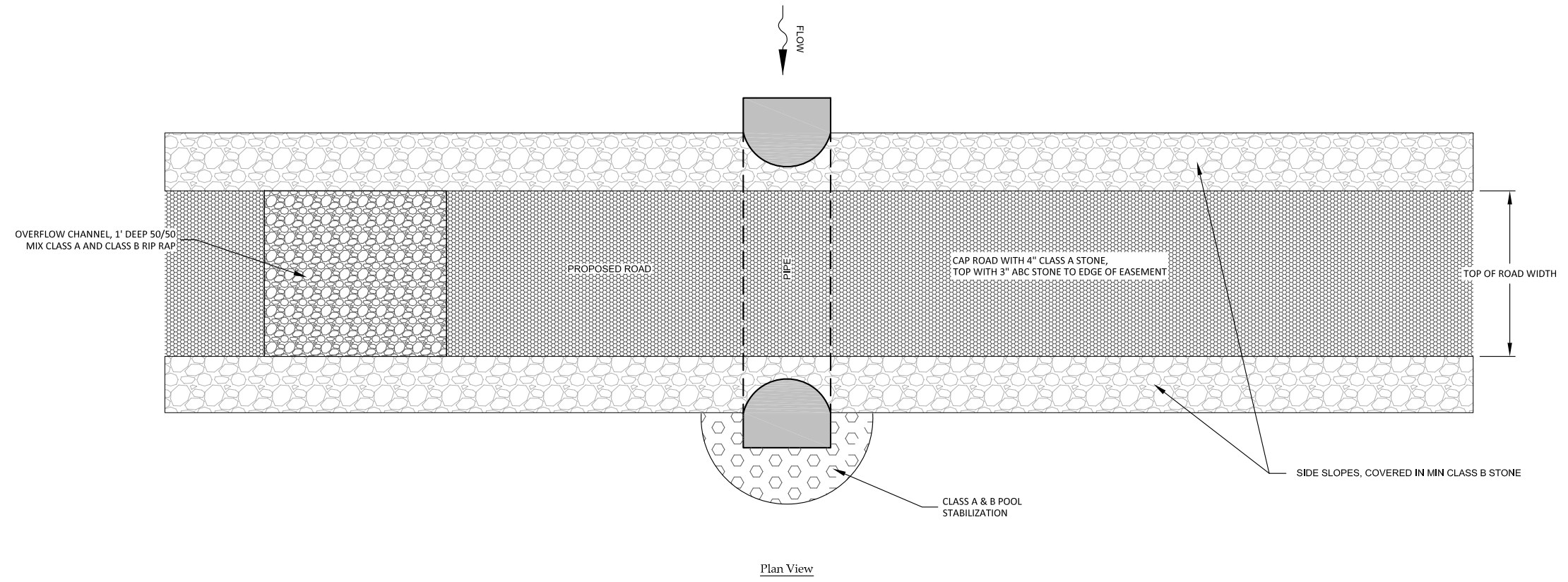
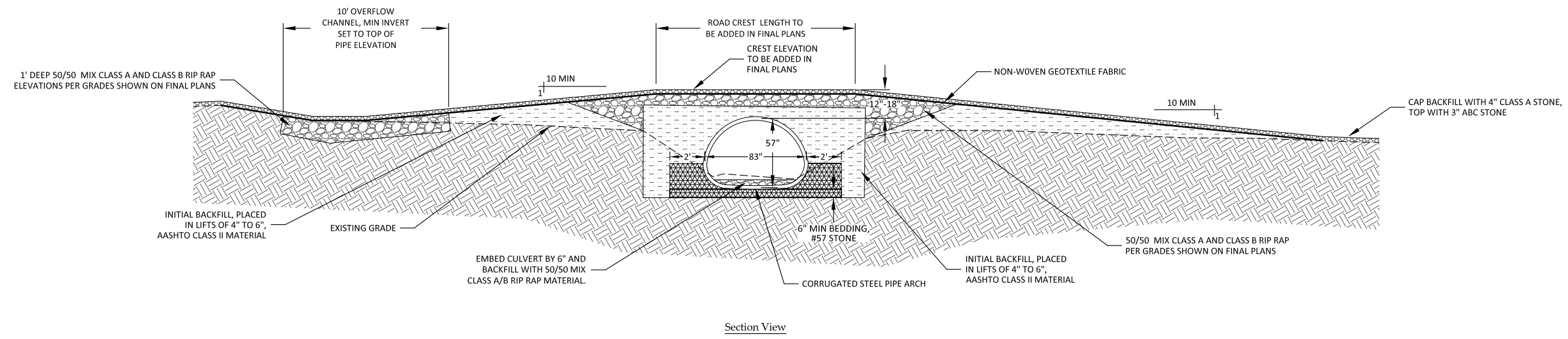
Sandy Branch Mitigation Site
 Chatham County, North Carolina

Details

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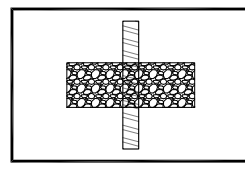
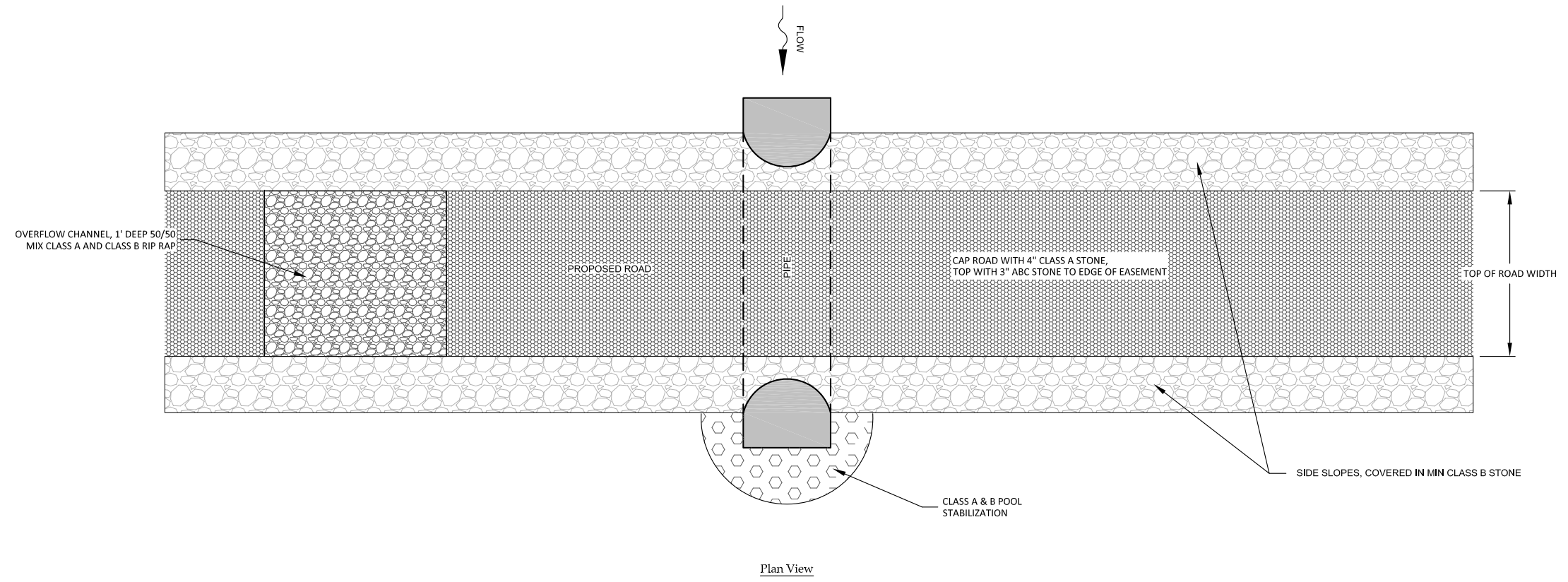
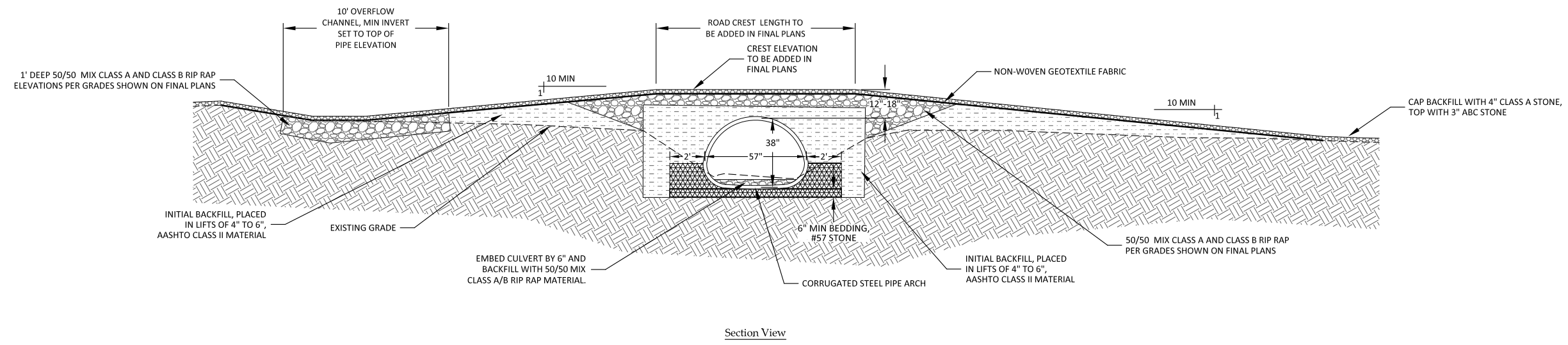
Date: 12.12.2019
 Job Number: 005-02173
 Project Engineer: GAT
 Drawn By: CAW
 Checked By: ANA

5.07



1
5.08 Permanent Culvert Crossing - Sandy Branch Reach 1
Not to Scale

Revisions:



Permanent Culvert Crossing - UT1
 1/5.09 Not to Scale

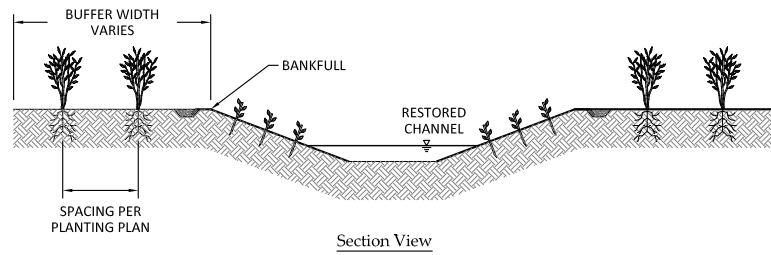
PRELIMINARY
 DO NOT
 USE FOR
 CONSTRUCTION

**Sandy Branch Mitigation Site
 Chatham County, North Carolina**

Revisions:

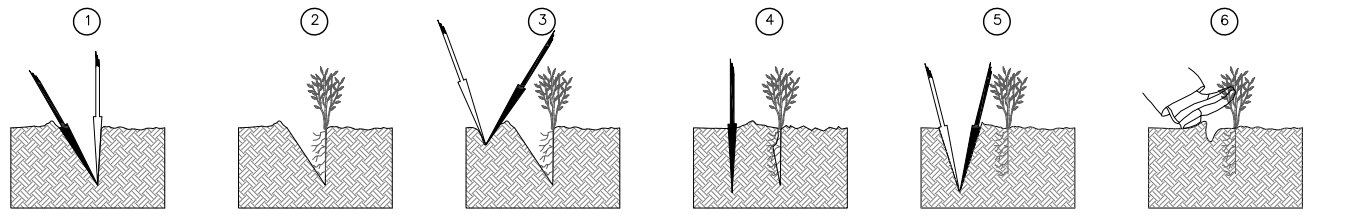
Date:	12.12.2019
Job Number:	005-02173
Project Engineer:	GAT
Drawn By:	CAW
Checked By:	ANA

December 12, 2019
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DIBBLE BAR
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION AND SHALL BE 12" LONG, 4" WIDE, AND 1" THICK AT CENTER.

ROOTING PRUNING
ALL ROOTS SHALL BE PRUNED TO AN APPROPRIATE LENGTH TO PREVENT J-ROOTING.



1 INSERT THE DIBBLE, OR SHOVEL, STRAIGHT DOWN INTO THE SOIL TO THE FULL DEPTH OF THE BLADE AND PULL BACK ON THE HANDLE TO OPEN THE PLANTING HOLE. (DO NOT ROCK THE SHOVEL BACK AND FORTH AS THIS CAUSES SOIL IN THE PLANTING HOLE TO BE COMPACTED, INHIBITING ROOT GROWTH.)

2 REMOVE THE DIBBLE, OR SHOVEL, AND PUSH THE SEEDLING ROOTS DEEP INTO THE PLANTING HOLE. PULL THE SEEDLING BACK UP TO THE CORRECT PLANTING DEPTH (THE ROOT COLLAR SHOULD BE 1-3" BELOW THE SOIL SURFACE). GENTLY SHAKE THE SEEDLING TO ALLOW THE ROOTS TO STRAIGHTEN OUT. DO NOT TWIST OR SPIN THE SEEDLING OR LEAVE THE ROOTS J-ROOTED.

3 INSERT THE DIBBLE, OR SHOVEL, SEVERAL INCHES IN FRONT OF THE SEEDLING AND PUSH THE BLADE HALFWAY INTO THE SOIL. TWIST AND PUSH THE HANDLE FORWARD TO CLOSE THE TOP OF THE SLIT TO HOLD THE SEEDLING IN PLACE.

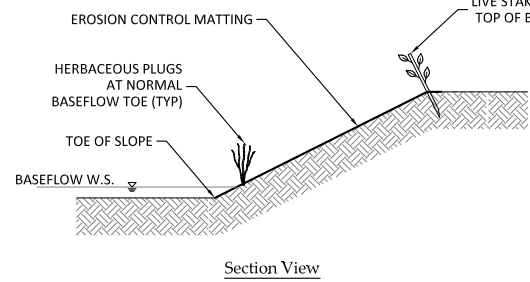
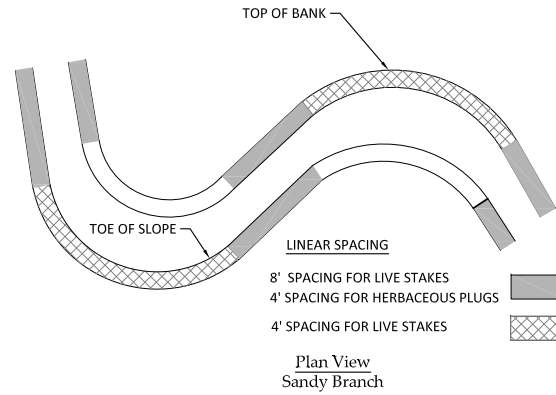
4 PUSH THE DIBBLE, OR SHOVEL, DOWN TO THE FULL DEPTH OF THE BLADE.

5 PULL BACK ON THE HANDLE TO CLOSE THE BOTTOM OF THE PLANTING HOLD. THEN PUSH FORWARD TO CLOSE THE TOP, ELIMINATING AIR POCKETS AROUND THE ROOT.

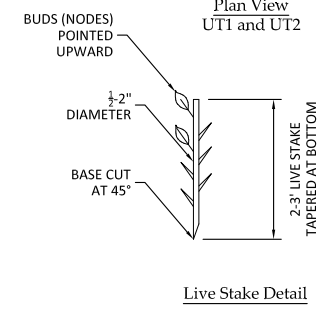
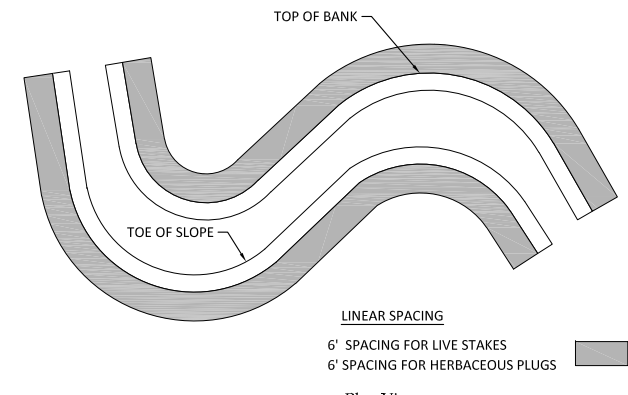
6 REMOVE THE DIBBLE, OR SHOVEL, AND CLOSE AND FIRM UP THE OPENING WITH YOUR HEEL. BE CAREFUL TO AVOID DAMAGING THE SEEDLING.

- NOTES:**
- ALL SOILS WITHIN THE BUFFER PLANTING AREA SHALL BE DISKED, AS REQUIRED, PRIOR TO PLANTING.
 - ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.

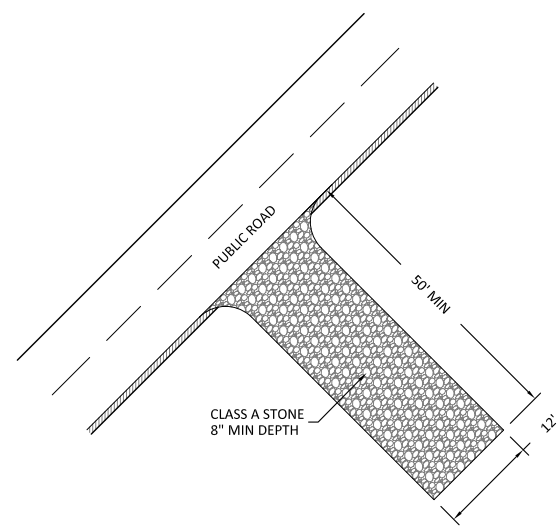
1 Bare Root Planting
5.10 Not to Scale



2 Streambank Planting
5.10 Not to Scale

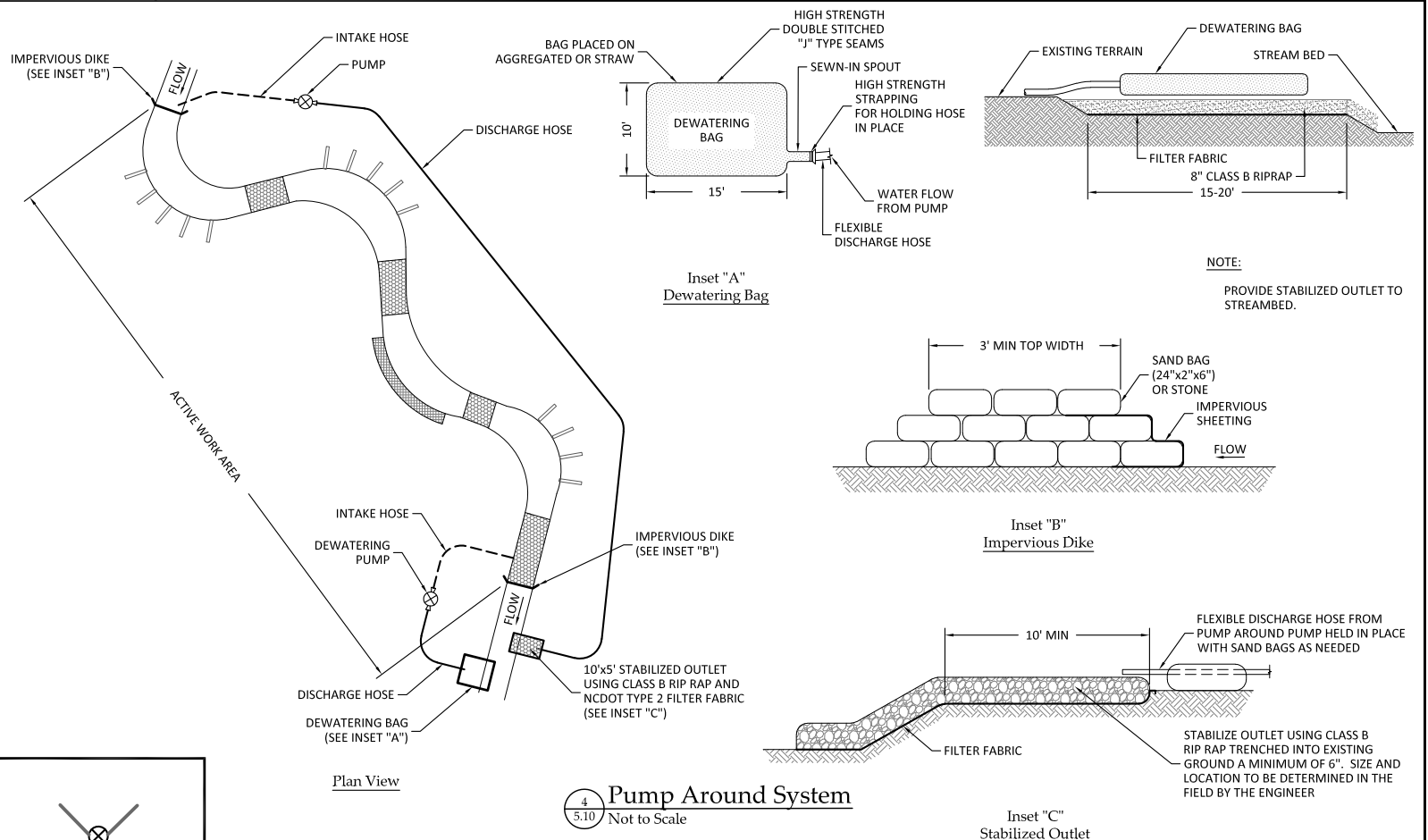


- NOTES:**
- CONTRACTOR RESPONSIBLE TO FOLLOW PLAN VIEW DETAILS BY REACH SHOWN ABOVE
 - REFER TO SPECIFICATIONS FOR PROPER STORAGE, HANDLING AND INSTALLATION.
 - FORM PILOT HOLE IN HARD SOIL OR STONY CONDITIONS TO PREVENT DAMAGE TO LIVE STAKES.
 - LIVE STAKES TO BE PLANTED IN AREAS AS SHOWN ON PLANS AND DIRECTED BY THE ENGINEER.
 - INSTALL DORMANT PRIOR TO LEAF OUT. DEPICTED CONDITION WITH LEAVES NOT REPRESENTATIVE OF STAKES AT TIME OF INSTALLATION.



- NOTES:**
- PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
 - LOCATE CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
 - MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOP DRESSING WITH STONE WILL BE NECESSARY.
 - ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED IMMEDIATELY.
 - USE CLASS A STONE OR OTHER COARSE AGGREGATE APPROVED BY THE ENGINEER.
 - PLACE FILTER FABRIC BENEATH STONE.

3 Construction Entrance
5.10 Not to Scale

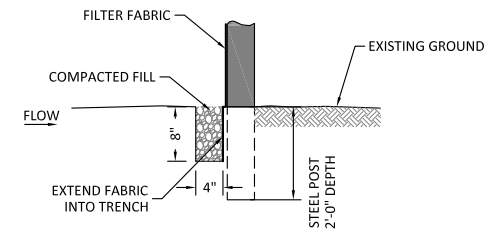
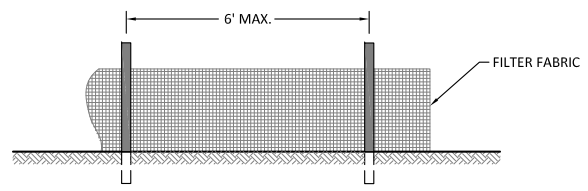


4 Pump Around System
5.10 Not to Scale

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

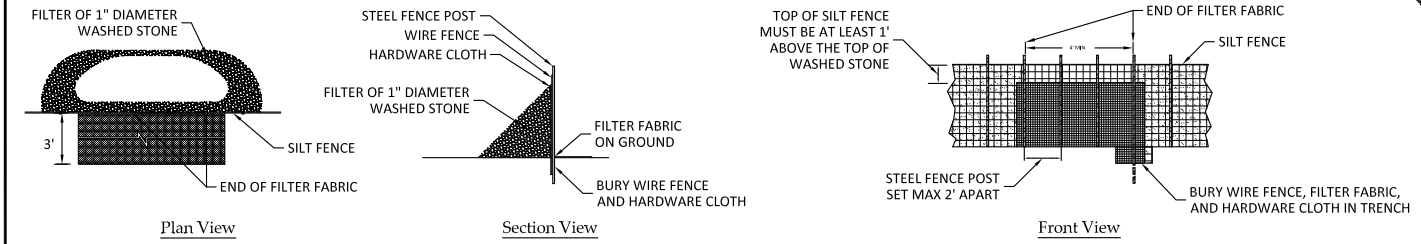
Revisions:

Date: 12.12.2019
Job Number: 005-02173
Project Engineer: GAT
Drawn By: CAV
Checked By: ANA



- NOTES:**
1. USE FILTER FABRIC OF MINIMUM 36" IN WIDTH AND FASTEN ADEQUATELY TO WIRES AS DIRECTED BY THE ENGINEER.
 2. FILTER FABRIC SHALL BE BURIED A MINIMUM OF 8" IN THE GROUND WITH A 4" SKIRT.
 3. PROVIDE 5" STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.
 4. INSPECT AFTER EACH RAIN EVENT AND MAINTAIN ACCORDING TO NCDEQ DESIGN MANUAL.

1
5.11 Temporary Silt Fence
Not to Scale



INSTALLATION
REFER TO THE PLANS FOR LOCATIONS AND SPECIFICATIONS. DURING INSTALLATION OF THE SILT BARRIER OR SILT FENCE, INSPECT THE INSTALLATION TO DETERMINE IF OUTLETS ARE NEEDED ACCORDING TO THE CRITERIA SET FORTH IN THE SPECIFICATIONS FOR THE BARRIER AND FENCE. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE PERSONNEL ON THE SITE FOR ASSISTANCE. EROSION CONTROL PERSONNEL HAVE COPIES OF INSTRUCTIONS AND MAY HAVE PHOTOGRAPHS OF PROPERLY INSTALLED OUTLETS AS AN AID TO INSTALLATION.

IF THE SILT FENCE OUTLET IS NOT INSTALLED CORRECTLY THE FIRST TIME, IT WILL HAVE TO BE REBUILT.

DETERMINE THE EXACT LOCATION ON THE GROUND BEFORE COMPLETING INSTALLATION OF THE SILT FENCE, TAKING INTO CONSIDERATION:

INSTALL THE OUTLET AT THE LOWEST POINT(S) IN THE BARRIER OR FENCE WHERE WATER WILL POND.

INSTALL THE OUTLET WHERE IT IS ACCESSIBLE FOR INSTALLATION, MAINTENANCE, AND REMOVAL.

ALLOW AT LEAST:
15 FEET BETWEEN THE BARRIER OR FENCE AND SINGLE-STORY BUILDINGS.
25 FEET FOR FORK LIFTS BETWEEN THE BARRIER OR FENCE AND MULTIPLE-STORY BUILDINGS.
10 FEET BETWEEN THE BARRIER OR FENCE AND THE TOE OF FILL SLOPES.

PLACE THE OUTLET SO THAT WATER FLOWING THROUGH IT WILL NOT CREATE AN EROSION HAZARD BELOW. AVOID STEEP SLOPES BELOW THE OUTLET AND AREAS WITHOUT PROTECTIVE VEGETATION. USE SLOPE DRAINS IF NECESSARY.

DETERMINE THE LOCATION OF THE OUTLET: FOR A SILT BARRIER, WHEN THE TRENCH IS DUG TO BURY THE BOTTOM OF THE FABRIC BECAUSE THE BARRIER WILL BE OMITTED AT THE OUTLET; FOR A SILT FENCE, WHEN THE WIRE FENCE IS IN PLACE BECAUSE THE FILTER FABRIC WILL BE OMITTED AT THE OUTLET.

REFER TO THE ILLUSTRATIONS OF THE OUTLET IN THE PLANS.

CLEAR STUMPS AND ROOTS FROM THE LOCATION OF THE OUTLET. CLEAR ADEQUATE ACCESS FOR THE EQUIPMENT NEEDED FOR INSTALLATION, MAINTENANCE, AND REMOVAL.

FOR A SILT BARRIER:
JUST BELOW THE GAP IN THE BARRIER, PLACE A LAYER OF FILTER FABRIC ON THE GROUND TO PROTECT THE SOIL FROM EROSION BY OUTFLOW FROM THE OUTLET; PLACE 6" OF THE UPPER EDGE IN THE TRENCH. STAKE THE REMAINING EDGES OF THE FABRIC TO HOLD IT IN PLACE.

ALONG THE GAP WHERE THE OUTLET WILL GO, PLACE STEEL FENCE POSTS FOR STRENGTH. THE POSTS MUST BE A MAXIMUM OF 24" APART AND DRIVEN INTO SOLID GROUND AT LEAST 18".

PLACE HARDWARE CLOTH (WELDED GALVANIZED SCREEN WITH SQUARE 1/4-1/2" HOLES) ON THE UPHILL SIDE OF THE POSTS TO HOLD THE WASHED STONE IN PLACE. PUT 6" OF THE BOTTOM OF THE CLOTH IN THE TRENCH AND FASTEN IT TO THE POSTS WITH LENGTHS OF WIRE.

BURY THE BOTTOM OF THE HARDWARE CLOTH AND THE UPPER EDGE OF THE FILTER FABRIC BELOW THE OUTLET IN THE TRENCH AND COMPACT THE FILL.

PLACE A FILTER OF 1" DIAMETER WASHED STONE ON THE UPHILL SIDE OF THE OUTLET. PILE THE STONE UP TO THE TOP OF THE HARDWARE CLOTH AND OVER THE JOINT BETWEEN THE OUTLET AND THE BARRIER.

FOR A SILT FENCE:
JUST BELOW THE GAP IN THE FENCE, PLACE A LAYER OF FILTER FABRIC ON THE GROUND TO PROTECT THE SOIL FROM EROSION BY OUTFLOW FROM THE OUTLET; PLACE 6" OF THE UPPER EDGE IN THE TRENCH. STAKE THE OTHER EDGES OF THE FABRIC TO HOLD IT IN PLACE.

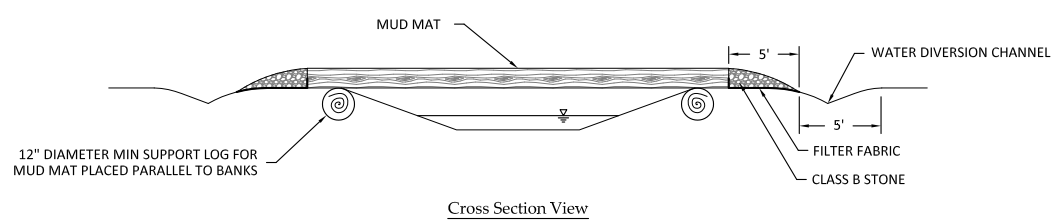
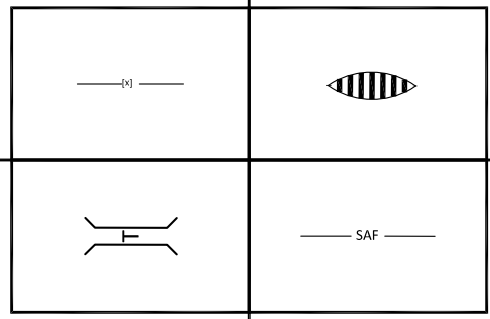
ALONG THE GAP WHERE THE OUTLET WILL GO, PLACE ADDITIONAL STEEL FENCE POSTS FOR STRENGTH. THE POSTS MUST BE A MAXIMUM OF 24" APART AND DRIVEN INTO SOLID GROUND AT LEAST 18".

PLACE HARDWARE CLOTH (WELDED GALVANIZED SCREEN WITH SQUARE 1/4-1/2" HOLES) ON THE UPHILL SIDE OF THE POSTS TO HOLD THE WASHED STONE IN PLACE. PUT 6" OF THE BOTTOM OF THE CLOTH IN THE TRENCH AND FASTEN IT TO THE POSTS WITH LENGTHS OF WIRE.

BURY THE BOTTOM OF THE HARDWARE CLOTH, THE UPPER EDGE OF THE FILTER FABRIC BELOW THE OUTLET, AND THE WIRE FENCE IN THE TRENCH AND COMPACT THE FILL.

PLACE A FILTER OF 1" DIAMETER WASHED STONE ON THE UPHILL SIDE OF THE OUTLET. PILE THE STONE UP TO THE TOP OF THE HARDWARE CLOTH AND OVER THE JOINT BETWEEN THE OUTLET AND THE SILT FENCE.

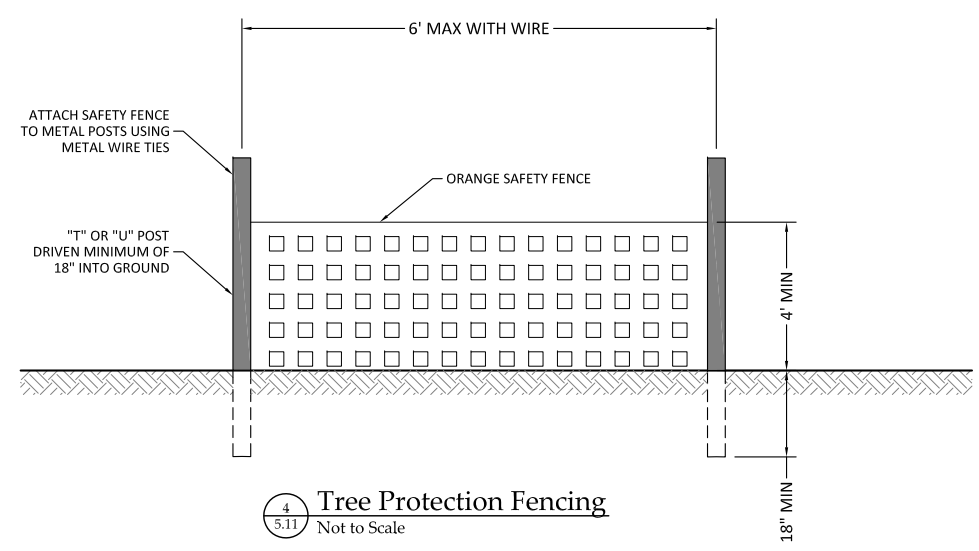
2
5.11 Temporary Silt Fence Gravel Outlet
Not to Scale



- NOTES:**
1. CONSTRUCT STREAM CROSSING WHEN FLOW IS AT NORMAL BASEFLOW.
 2. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM.
 3. INSTALL STREAM CROSSING PERPENDICULAR TO FLOW.
 4. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
 5. STABILIZE AN ACCESS RAMP OF CLASS B STONE TO THE EDGE OF THE TIMBER MAT.
 6. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.
 7. MATS FOR SANDY BRANCH SHALL BE 28' IN LENGTH OR A MIN OF 4' LONGER THAN TOP OF BANK WIDTH.
 8. MATS FOR UT1 AND UT2 SHALL BE 16' LONG OR A MIN OF 4' WIDER THAN TOP OF BANK WIDTH.
 9. ALL MATS SHALL BE 8" IN WIDTH.
 10. 16' MATS SHALL BE CONSTRUCTED OF MIN 8"x8" HARDWOOD TIMBERS.
 11. MATS LONGER THAN 16' SHALL BE CONSTRUCTED OF MIN 12"x12" HARDWOOD TIMBERS.

3
5.11 Temporary Stream Crossing - Timber Mat
Not to Scale

MATERIAL SPECIFICATIONS		
PHYSICAL PROPERTY	TESTS	REQUIREMENTS
MATERIAL	N/A	POLYETHYLENE
RECOMMENDED COLOR	N/A	"INTERNATIONAL ORANGE"
TENSILE YIELD	ASTM D638	AVE. 2000 LBS. PER 4' WIDE
ULTIMATE TENSILE STRENGTH	ASTM D638	AVE. 2900 LBS. PER 4' WIDE
ELONGATION AT BREAK (%)	ASTM D638	GREATER THAN 1000%
CHEMICAL RESISTANCE	N/A	INERT TO MOST CHEMICALS AND ACIDS



4
5.11 Tree Protection Fencing
Not to Scale

PRELIMINARY
DO NOT
USE FOR
CONSTRUCTION

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Chatham County, North Carolina

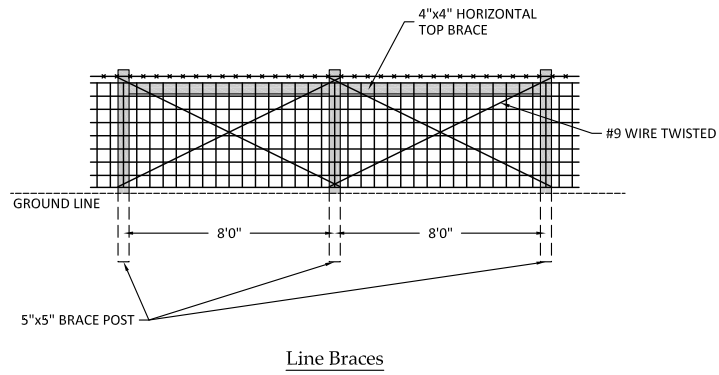
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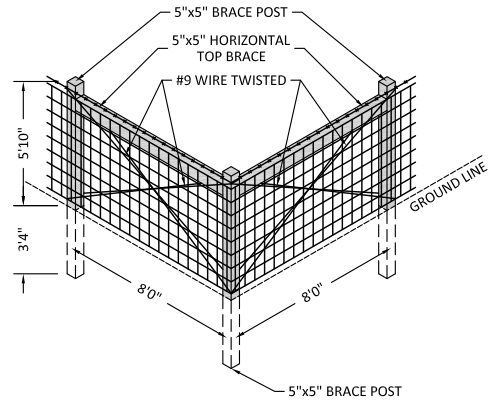
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Job Number: 005-02173
Project Engineer: GAT
Drawn By: CAW
Checked By: ANA

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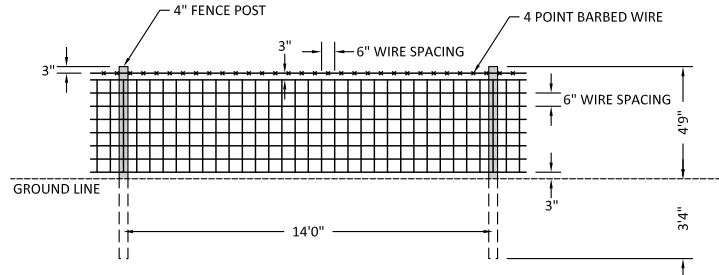
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Line Braces

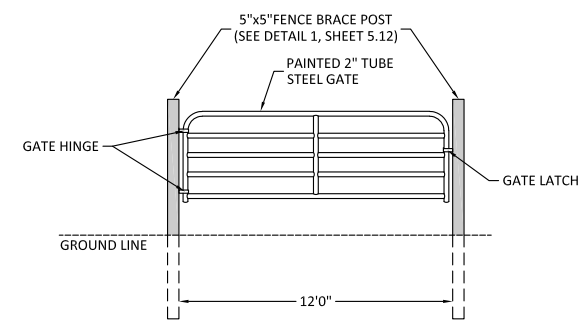


Fence Corner

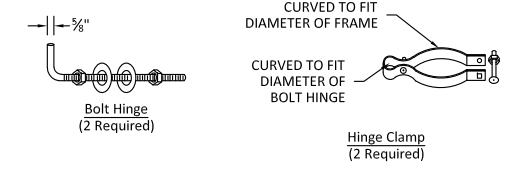


Typical Span

NOTE:
 ERECT LINE BRACES BETWEEN END, CORNER, OR GATE POSTS AT INTERVALS NOT EXCEEDING 600 FEET.



Access Gate

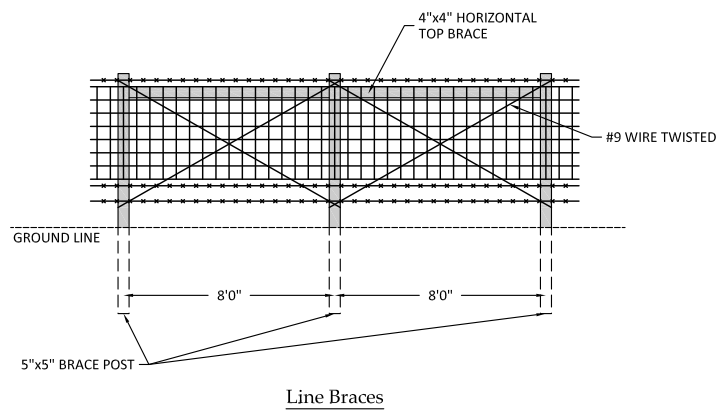
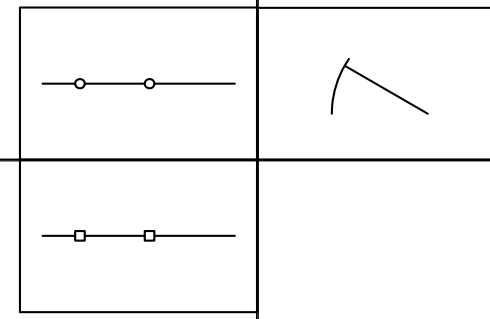


Hinge Assembly

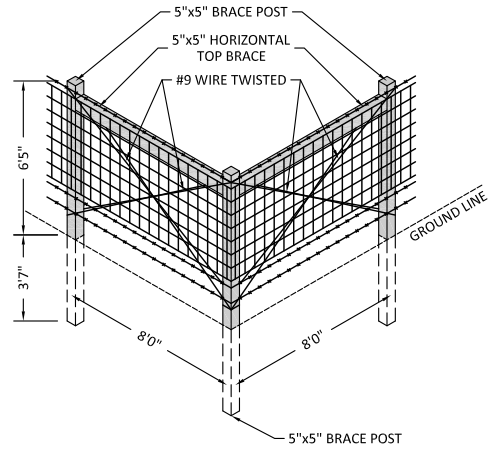
- NOTES:**
1. USE LATCH DEVICE APPROVED BY THE ENGINEER. HINGE ASSEMBLY AS SHOWN IS SUGGESTED. SUBSTITUTION MAY BE SUBJECT TO APPROVAL BY THE ENGINEER.
 2. ANY GATE TYPE MEETING THE APPROVAL OF THE ENGINEER IS ACCEPTABLE AND IS NOT LIMITED TO THE EXAMPLE SHOWN HEREON.

1
 5.12 Woven Wire Fence - Permanent Easement Fencing
 Not to Scale

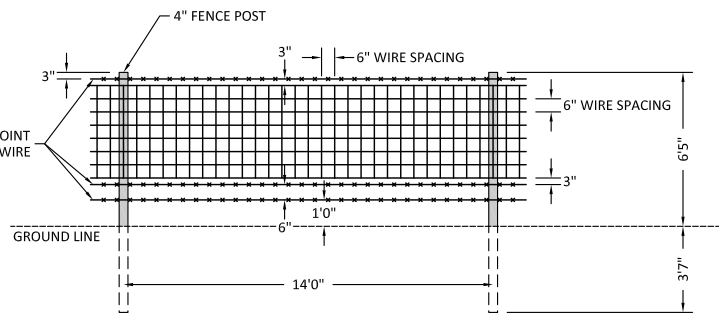
2
 5.12 12' Tube Steel Gate
 Not to Scale



Line Braces



Fence Corner



Typical Span

NOTE:
 ERECT LINE BRACES BETWEEN END, CORNER, OR GATE POSTS AT INTERVALS NOT EXCEEDING 600 FEET.

3
 5.12 Woven Wire Fence with 2-Strand Barbed Wire Lower - Permanent Fencing at Easement Crossing
 Not to Scale

PRELIMINARY
 DO NOT
 USE FOR
 CONSTRUCTION

Revisions:
